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Final Revised Field Sampling Plan
Supplemental Soil Investigation
Montrose Superfund Site
20201 Normandie Avenue
Torrance, California 90502

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March 2005

FINAL REVISED FIELD SAMPLING PLAN
SUPPLEMENTAL SOIL INVESTIGATION
MONTROSE SUPERFUND SITE
20201 NORMANDIE AVENUE
TORRANCE, CALIFORNIA 90502

U.S. ENVIRONMENTAL PROTECTION AGENCY REGION IX

Sample Plan Title: Final Revised Field Sampling Plan Supplemental Soil Investigation

Site Name: Montrose Superfund Site

Site Location: 20201 S. Normandie Avenue

City/State/Zip: Torrance, California 90502

Site EPA ID#: CAD 008242711

Anticipated Sampling Dates: _____Starting on March 28, 2005_____

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SAP Approval Date:

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Chief, Quality Assurance Office
Environmental Services Branch, OPM

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ACRONYMS

AOC	Administrative order on consent
bgs	Below ground surface
BHC	Benzene hexachloride
BTEX	Benzene, toluene, ethylbenzene, and total xylenes
CCR	California Code of Regulations
CDHS	California Department of Health Services
CDWR	California Department of Water Resources
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Chain-of-custody
CPA	Central processing area
DDT	Dichlorodiphenyltrichloroethane
DNAPL	Dense nonaqueous phase liquid
DOT	Department of Transportation
DTSC	Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
FID	Flame ionization detector
FS	Feasibility study
FSP	Field Sampling Plan
HASP	Health and Safety Plan
HHRA	Human health risk assessment
HPLC	High-performance liquid chromatography
IDW	Investigation-derived wastes
LADWP	Los Angeles Department of Water and Power
MCB	Monochlorobenzene
MDL	Method detection limit
µg/kg	Micrograms per kilogram
mg/kg	Milligrams per kilogram
MS/MSD	Matrix spike and matrix spike duplicate
NAPL	Nonaqueous phase liquid
NPL	National Priorities List
O-S	Objective-specific
OSHA	Occupational Safety and Health Administration
PCE	Tetrachloroethene
PEA	Preliminary Endangerment Assessment
PD	Playa Deposits
PID	Photoionization detector
PPE	Personal protective equipment
ppm	Parts per million
PRG	Preliminary remediation goal
PVS	Palos Verdes Sands
QA/QC	Quality assurance/quality control

QAPP	Quality Assurance Project Plan
QC	Quality Control
RI	Remedial Investigation
RI/FS	Remedial investigation and feasibility study
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
TCE	Trichloroethene
UBA	Upper Bellflower Aquitard
VOA	Volatile organic analysis
VOC	Volatile organic compounds

1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

This Final Revised Supplemental Soil Investigation Field Sampling Plan (FSP) has been prepared to support the field and laboratory activities for additional soil sampling at the Montrose Chemical Superfund Site (Montrose Site) located in Los Angeles County, California (**Figure 1**). This field sampling event is a crucial next step in completing the feasibility study (FS) for on- and near-Property soil at the former Montrose Chemical Plant property (Property). This revised FSP was initially developed by the U.S. Environmental Protection Agency (EPA) Region IX in October 2003 (EPA, 2003) and in accordance with *Guidance for Preparation of a U.S. EPA Region IX Field Sampling Plan for EPA-Led Superfund Projects* (EPA, 1993). The revised FSP is accompanied by the *Revised Quality Assurance Project Plan* (QAPP) (Earth Tech, 2005), also originally prepared by EPA, and later revised by Montrose.

Following a series of technical meetings, Montrose and EPA agreed upon a suitable scope of work for the revised FSP. On June 9, 2004, Montrose requested that EPA review draft FSP figures and tables for accuracy in representing the revised scope of work for the Montrose Site. In a letter dated June 16, 2004, EPA reviewed the draft FSP figures and tables with minor comments and transferred preparation of the revised draft FSP to Montrose. Montrose submitted a revised draft FSP to EPA for review on September 7, 2004. EPA commented on the revised draft FSP in a letter dated November 23, 2004. Montrose responded to EPA's comments on January 4, 2005. In a letter dated January 25, 2005, EPA commented on Montrose's responses and requested submittal of the final draft FSP. **Appendix A** contains copies of the EPA comment letters (EPA, 2004, 2004a, 2005).

The following sections of this revised FSP present the background information, investigation approach, sampling rationale, chemical analyses to be performed, detailed field sampling procedures, and a health and safety plan (HASP) for field activities to be conducted at the Montrose Site, including:

- On-Property locations
- Former Boeing property
- Union Pacific Railroad right-of-way
- Normandie Avenue Ditch and historical ponding area
- Los Angeles Department of Water and Power (LADWP) right-of-way
- Farmer Brothers Coffee Company (Farmer Brothers) property
- The commercial business areas directly east of the Montrose Property across Normandie Avenue
- The Western Waste parcel (located south of the business area and north of Del Amo Boulevard).
- A separate FSP for the Jones Chemical Incorporated (Jones) property is being prepared as a joint effort between Jones and Montrose.

1.2 Statement of Purpose

In 1998, EPA completed the *Final Remedial Investigation* (RI) *Report* (EPA, 1998) for the Montrose Chemical Superfund Site, after representatives for Montrose Chemical Corporation of California (Montrose) failed to produce a draft of the report acceptable to EPA. Subsequently, EPA has conducted

additional sampling and removal actions for the Kenwood Stormwater Drainage Pathway, and will supplement or amend the RI Report (EPA, 2001). The 1998 RI Report coincided with the remedy selection process for groundwater, which was completed in 1999.

However, EPA has now determined that further characterization of the nature and extent of contamination at the Montrose Site is necessary for providing data to support the human health risk assessment (HHRA) the feasibility study, and subsequent completion of the remedy selection process for soil on and near the Montrose Property. This revised FSP presents the identified data needs and sampling efforts intended to largely meet these additional data needs to allow for the completion of the soil FS. It is anticipated that the RI Report will be supplemented or amended to incorporate the data collected and subsequent analytical findings as part of the effort set forth in this revised FSP.

EPA is continuing its investigation of historic activities at, and other information concerning, the Montrose Property and other areas covered by this sampling plan. As such, the underlying factual basis for the various sampling rationales may be supplemented or altered as the result of the EPA continuing investigation. Except for the discussion of the actual operation of the Montrose dichlorodiphenyltrichloroethane (DDT) manufacturing plant, the remainder of the factual basis for the sampling effort rationale should be considered preliminary. In addition, the EPA continuing investigation may uncover additional factual information that will require further sampling efforts.

1.3 Site Background

1.3.1 Site History

In 1943, Stauffer Chemical Company (Stauffer) purchased 18 acres of land located on Normandie Avenue in Torrance, California, including what are now the Montrose and Jones properties. This property had previously been the Hughes-Mitchell plant and included a sulfuric acid plant. The sulfuric acid plant reportedly used the Manheim furnace process; this process burns or roasts sulfide ore raw material to generate sulfur dioxide. The sulfur dioxide was then reportedly converted to sulfur trioxide, and absorbed in sulfuric acid (Levine-Fricke, 1995). From 1943 until 1951, Stauffer continued to operate the sulfuric acid plant on what is currently Jones property, but may have switched to producing sulfuric acid by burning sulfur, which would have generated limited ash.

From 1947 to 1982, Montrose operated a DDT manufacturing plant on what came to be 13 acres. This land was leased from Stauffer. **Figure 2** provides an aerial photograph of the Montrose Property from 1952. The sulfuric acid plant was dismantled after 1965. Jones leased the remaining 5 acres of the Stauffer property from 1951 until purchasing the land from Stauffer in 1968 (Levine-Fricke, 1995).

In 1982, EPA conducted a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) inspection at the Montrose plant; DDT was detected in surface water samples collected from the nearby Normandie Avenue Ditch and historical ponding area. Following the termination of the plant operations in 1982, the plant was dismantled and the majority of concrete, including footings, was excavated, crushed, and stored onsite. The demolition was completed in early 1983; in 1984 and 1985, Montrose graded and covered most of the property with asphalt. A detailed description of the grading activities can be found in the *Buried Concrete Debris and DDT-Impacted Soil Volumetric Estimates, Montrose Superfund Site Report* (referred to as the *Buried Debris Report*) (Earth Tech, 2003), and in EPA's review letter dated January 13, 2004 (EPA, 2004b).

Environmental investigations of the Montrose Property continued under the oversight of EPA, and initially, the California Regional Water Quality Control Board (RWQCB), Los Angeles Region. EPA proposed the Site for the Superfund National Priorities List (NPL) in 1984, and the proposal was finalized in 1989. In 1985, EPA and Montrose entered into an administrative order on consent (AOC) that required Montrose to perform a remedial investigation and feasibility study (RI/FS) for the Montrose Site. This investigation included addressing contamination in areas both on and off the former Montrose Property. The AOC was amended in 1987 and again in 1989. Portions of the RI/FS work have been taken over and completed by EPA, while other portions have been completed by Montrose. A subset of RI/FS work remains to be completed, including a feasibility study for on- and near-Property soil, addressing the soil at the Montrose Property and properties near it. In September 1999, Montrose submitted to EPA a draft Soil FS (Earth Tech, 1999), which EPA did not accept. The scope of work identified in this revised FSP will provide data for use in revising the Soil FS and address data gaps identified by EPA.

DDT releases from plant operations impacted surface and subsurface soils at the former plant, surrounding commercial/industrial and neighborhood properties, and sediments in the sanitary sewer and Normandie Avenue Ditch and historical ponding area (adjacent to the Property). Dense nonaqueous phase liquid (DNAPL), consisting primarily of monochlorobenzene (MCB) and dissolved DDT, is present under the former plant property and is serving as a continuous source of groundwater contamination. Groundwater at the Montrose Site is contaminated with MCB and other chemicals across six hydrostratigraphic units (aquitards and aquifers) to depths up to approximately 250 feet below surface and to distances of up to approximately 1.3 miles from the former Montrose Plant.

Since the 1985 grading of the Montrose Property, many "postgrading" environmental subsurface soil investigations have taken place both on- and off-Property as part of efforts to complete the RI. A summary of findings from these investigations can be found in the RI Report (EPA, 1998).

The 1998 RI Report compiled and evaluated data collected at the Montrose Property, including data from 1981 and 1983 (before the on-Property soil was graded), as well as data collected between 1985 and 1997 (after the grading). RI sample locations were determined using a variety of techniques including grids, transects across drainages, and near known source areas. The need to supplement these efforts is discussed in the following sections.

1.3.2 Location

The Montrose Property is located at 20201 Normandie Avenue, Torrance, California 90502 as identified by the United States Postal Service. However, the area between Western and Normandie Avenues has been identified as the City of Los Angeles, and therefore, the Montrose Property is actually located in the City of Los Angeles boundaries. It currently is unoccupied, fenced, and covered with asphalt. The entrance is at the northeast corner of the property along Normandie Avenue. The Montrose Property and other surrounding properties are shown in **Figure 3** as an aerial photograph from 2003. The only on-Property features are three large, raised, asphalt building pads that Montrose constructed in 1985 to support planned future warehouses, and five cells containing soil removed during the Kenwood Stormwater Drainage Pathway Removal Action, which are located in the western area of the property. Surface water drainage is toward the southeast corner of the Montrose Property and the Normandie Avenue Ditch and historical ponding area.

The land surrounding the Montrose Property is zoned for industrial use (City of Los Angeles, 1996). Bordering the property to the east are Normandie Avenue and the Union Pacific Railroad right-of-way. The Jones property and LADWP land border the property to the south; the Farmer Brothers plant property

borders the south edge of the LADWP property. To the north and west of the Montrose Property, respectively, are the Boeing Corporation property (formerly the location of the McDonnell Douglas manufacturing plant) currently undergoing redevelopment, and the Frito-Lay Corporation distribution facility. Beyond this central industrial area, to the southeast and southwest, are areas of residential zoning.

1.3.3 Geology

The Montrose Property is located within the West Coast Basin of the Torrance Plain. The Ballona Escarpment bounds the Basin to the north, the Newport-Inglewood Uplift to the east, Palos Verdes Hills to the southwest, and the Pacific Ocean to the west. There are four major structural features in the vicinity of the Montrose Site within the Torrance Plain: the Charnock Fault, the Palos Verdes Fault, the Torrance Anticline, and the Gardena Syncline (EPA, 1998; and, California Department of Water Resources [CDWR], 1961).

The stratigraphy of the West Coast Basin includes Quaternary age continental and marine deposits and Tertiary age marine sediments overlying a basement complex of igneous and metamorphic rocks. The geologic units of hydrogeologic interest are (in order from oldest to youngest): the Pico Formation; the San Pedro Formation; the Lakewood Formation; and, older dune sand, alluvium, and active dune sand (EPA, 1998; CDWR, 1961).

Hydrogeologic units in the West Coast Basin include aquitards and aquifers of varying compositions and water-yielding properties. These units, in order from first water encountered to deeper units, include: the Bellflower Aquitard, the Gage Aquifer, an unnamed aquitard, the Lynwood Aquifer, another unnamed aquitard, and the Silverado Aquifer. A detailed discussion of the regional geologic, hydrogeologic, and physiographic setting is presented in the 1998 RI Report.

1.3.4 Site-Specific Geology

The site-specific geology of the Montrose Property consists of reworked Playa Deposits, the Palos Verdes Sand, and Upper Bellflower Aquitard. The grading at the Montrose Property in 1985 resulted in a layer of varying thickness of reworked material across the property. The geology of this material is discussed in the next section.

Immediately underlying the surficial reworked material, at various depths across the Site, are three generalized, unsaturated soil layers described as follows:

> Upper Layer - Playa Deposits (PD): This layer is found near surface to depths of approximately 25 feet below ground surface (bgs). According to grain size analyses of soil samples collected in this layer silt and clay comprise more than 65 percent of these soils.
>
> Middle Layer – Palos Verdes Sands - (PVS): This layer is found between approximately 25 and 45 feet bgs and consists primarily of fine-grained sands. According to grain size analysis of soil samples collected in this layer fine- and medium-grained sand comprise more than 70 percent of these soils.
>
> Lower Layer – Upper Bellflower Aquitard (UBA): This layer is found between approximately 45 feet bgs and groundwater (approximately 65 feet bgs) and consists of multiple thin sand layers interbedded with layers of silts and clays. Grain size analysis of soil samples collected in this layer ranged from more than 70 percent fine-grained sand to more than 60 percent silt. This soil layer varied from fine grain sands to clays and silts with increasing depth.

The first encountered groundwater beneath the Montrose Property is at approximately 65 to 70 feet bgs in the Upper Bellflower Aquitard (EPA, 1998).

2.0 SITE GRADING DURING PLANT DEMOLITION

2.1 Summary of Grading Activities

In 1984 and 1985, Montrose graded and redistributed the crushed concrete debris and top several feet of surface soil over the entire plant property using heavy earth-moving equipment. This activity included crushing concrete, digging trenches to bury debris, and performing cut-and-fill operations across the property. During grading, two large, raised pads (Building Pads A and B) were formed on the property as shown in **Figure 4**. It was thought that these could serve as foundations for future buildings such as warehouses, which were never built. Building Pad B has both a north and south portion that is separated by a stormwater surface channel. A third building area (Building C) was identified in the western portion of the property, but there was no large, raised pad constructed in this area.

As illustrated in the generalized cross section in **Figure 5**, the grading activities at the Montrose Property created three major components in the near-surface lithologic profile.

- Asphalt cover and base - The majority of the property is covered with an asphalt cover and an underlying base aggregate, approximately 0.5-foot thick. The aggregate was generated on-property by crushing the concrete debris from the facility demolition activities; samples of the crushed debris indicate that the material remains significantly contaminated with DDT.

- Reworked material - The reworked material, which was subject to cut and/or fill operations, consists of dark brown clayey silt, silty clay, or clay, and contains debris such as concrete fragments, gravel, red brick fragments, and wood. Pits and trenches containing demolition debris from the former plant, such as crushed footings, are present at localized positions across the property. Where these occur, they extend to as much as 15 feet bgs and into the native material. Not considering trenches, the depth of the reworked material varies across the Montrose Property, generally between 1 and 7 feet thick.

- Native material - The soil in this depth interval underlying the reworked material is native (undisturbed) soil of the Playa Deposits (see discussion of geology, above). Contamination may be present in this soil either where the reworked zone is thin or not present, or where contamination was driven (e.g., by sufficient hydraulic head such as under the wastewater recycling pond or under trenches) to a depth greater than the depth of the reworked zone.

The depths of reworked material currently existing across the Site are presented in the *Buried Debris Report*; this report also presents locations and depths of buried concrete footings, concrete debris used as fill, and crushed concrete used as aggregate beneath asphalt pavement (Earth Tech, 2003). No fill soil reportedly was brought onto the Site during grading. According to the *Buried Debris Report*, trenches were dug or deepened for deposition of concrete from demolition, and the excavated soil was used for fill. These fill areas are illustrated in **Figures 4** and **5**. The locations of buried concrete and concrete debris are shown in **Figure 6**.

As can be seen in **Figure 4**, there are five general areas within the property, and elevations of the ground surface vary between areas: Building Pads A, B, and C, the roadway areas, and the loading dock areas. Thickness of reworked material is reported to be: 6 to 6.5 feet within the elevated pad referred to as the Building A footprint (eastern property); 5 to 6 feet at the elevated pad referred to as the Building B footprint (central property, including the Central Processing Area [CPA]); approximately 0.7 to 3 feet in

the elevated pad referred to as the Building C footprint (northwest corner of the property); and, approximately 1 foot in most roadway and loading dock areas (Earth Tech, 2003).

In near- and off-Property areas, fill material, including debris such as wood fragments and glass, has been identified in the near-surface soil samples collected from the perimeter of the Montrose Property, the LADWP right-of-way, the Normandie Avenue Ditch and historical ponding area, and the Farmer Brothers property.

2.2 Impact of Historical Site Grading on This Investigation

Historical grading activities modified the distribution of contaminants and this has influenced the sampling rationale for this soil investigation. The grading, and cut and fill operations prevented identification of potential location-specific chemical impact, such as staining or stressed vegetation. Further, the reworked soil likely has been moved from its original location, and mixed with other soil and/or redistributed across the plant property. Original signatures of contamination that may have existed below sources thus were smeared, mixed, and/or moved to other property locations within the reworked zone.

To address the mixing and redistribution of shallow soil, the sampling strategy for this plan differentiates between the reworked zone and the native soil. The distinction is made because within the disturbed, reworked zone, sampling must address constituents from any former process on-Property. In contrast, sampling rationale for the native zone can be associated directly with historical process units or activities from that location. For the purposes of the revised FSP, the "reworked zone" is defined as the depth interval (of varying thickness) in which soil was moved during grading in 1985, and the "native zone" is defined as the undisturbed soil underlying the reworked zone. The point at which the reworked zone stops and the native zone starts shall be referred to as the rework/native interface.

3.0 BENCHMARKS FOR CHARACTERIZATION

Since issuing the RI Report in 1998, an assessment of appropriate soil benchmarks for investigation purposes at nearby residential communities has been conducted. In 2001 and 2002, EPA conducted a response action for DDT in soil at residences along the west side of Kenwood Avenue, about two blocks from the Montrose plant, where historically, a swale (and later a ditch) served as a stormwater drainage pathway from the former Montrose Property through the yards of these residences, and episodically carried entrained DDT. A previous investigation of DDT background levels in residential soil had found DDT levels averaging between 1 and 3 milligrams per kilogram (mg/kg), and ranging up to approximately 10 mg/kg. This concentration range for DDT corresponds to an excess residential cancer risk of less than 6×10^{-6} (6 in one million) for individuals hypothetically exposed over a lifetime. This is at the low end of EPA's "risk range," which represents the concentrations at which exposure to the contaminant, even over a lifetime, would be insignificant. EPA selected 10 mg/kg DDT as a site-specific cleanup standard for DDT in soil for the 2001-2002 Kenwood Stormwater Drainage Pathway removal action.

EPA considers it reasonable, for the purposes of this revised FSP, to use 10 mg/kg as a benchmark for defining where DDT contamination has been sufficiently defined. Use of this value for this purpose does not represent a determination by EPA that 10 mg/kg has been or will be selected by EPA as a performance standard for the on- and near-Property soil remedies.

For chemicals other than DDT, with exception of arsenic (see below), this revised FSP will use the chemical-specific industrial EPA Region IX Preliminary Remediation Goals (PRGs) dated October 2004 as benchmarks for sufficient characterization (PRGs are risk-based benchmarks corresponding to a one-in-a-million (1×10^{-06}) cancer risk for a hypothetical lifetime exposure, or a hazard index of unity for noncarcinogens, under standard exposure assumptions; they do not represent promulgated or selected cleanup goals. [EPA, 2004c]) The revised FSP will use the benchmark value of 10 mg/kg for arsenic. This value is within the DTSC background range for Southern California soil (8 to 11 mg/kg). Furthermore, for the Del Amo Superfund Site located approximately 1,000 feet to the east of the Montrose Plant Property, the Draft Baseline Risk Assessment analysis of background soil concentrations found the breakpoint between the regional background for arsenic and the non-ambient values to be 10 mg/kg (URS, 2001).

Table 1 presents the U.S. EPA Region IX PRGs for the chemicals of concern for this revised FSP; both residential and industrial exposure scenario PRGs are presented. The use of industrial exposure scenario PRGs is based in part on the preliminary findings of the EPA *Draft Former Montrose Chemical Property Reuse Assessment* (EPA, 2004d), which indicates that the most likely future land use will be for the property to remain industrial/commercial.

4.0 INVESTIGATION NEEDS AND OBJECTIVES

The purpose of this revised sampling plan is to obtain additional information on the nature and extent of contamination to complete the Soil FS and to conduct risk assessments for on- and off-Property areas. On- and near- property is defined as referring to the Montrose Property, the perimeter of the Montrose Property, the Normandie Avenue Ditch and historical ponding area, the former Boeing property and the Union Pacific Railroad right-of-way. Off-property is defined as referring to the LADWP right-of-way, the Farmer Brothers property, the commercial business areas directly east of the Montrose Property across Normandie Avenue, and the Western Waste parcel.

While the 1998 RI Report had sufficient data to support the FS for groundwater, EPA has determined that characterization data gaps exist for soil. Additional soil sampling is therefore necessary at the Montrose Site to complete the FS for soil and the HHRA. Data obtained from this soil sampling effort, in combination with existing data, is intended to be adequate to support evaluations of the presence, distribution, and concentrations of chemicals; to allow for completion of the risk assessments; to provide for greater certainty in the feasibility study regarding estimation of volumes requiring remediation; and to assist in evaluating the appropriateness and feasibility of remedial options. While the soil sampling effort intends to fill these data gaps, additional sampling may be needed in the future, for example to finalize the remedy selection process.

The following subsections identify analyte- and area-specific data gaps, and the corresponding investigation objectives that must be addressed to meet the purpose of this revised FSP investigation. The subsections are organized as follows:

On- and Near-Property Pesticides – sampling objectives for DDT and benzene hexachloride (BHC) are presented

On- and Near-Property Volatile Organic Compounds – sampling objectives for volatile organic compounds (VOCs) in the reworked soil, shallow native soil, and native soil to groundwater are discussed

On- and Near-Property Metals – sampling objectives for lead, arsenic, and chromium are presented

Off-Property Pesticide Data – sampling objectives are presented for the LADWP right-of-way, Farmer Brothers property, the business area east of Normandie Avenue, and the Western Waste parcel

4.1 ON- AND NEAR-PROPERTY PESTICIDES

DDT and BHC have been detected at elevated concentrations in samples taken on-Property and from the Normandie Avenue Ditch and historical ponding area. Other nearby areas are addressed separately as part of off-Property characterization. The results of this revised Montrose Soil FSP will be presented in a report. The Jones property investigation results may be reported as an addendum to the Montrose soil investigation results.

4.1.1 DDT

There have been many DDT samples taken on-Property, throughout the former plant area (**Figure 8**). In the CPA, sampling has determined that DDT is present in soil down to the water table. However, the sampling distribution (lateral and vertical) beyond the CPA is not adequate to complete an FS evaluation

of these areas. The lateral and vertical extent of DDT on-Property and in the Normandie Avenue Ditch and historical ponding area has not been defined.

Within the Montrose Property, soil samples were previously collected at the nodes of an approximate 200-foot grid, extending to depths of 6 to 9 feet bgs. DDT was detected in many of these samples, at concentrations ranging from less than 1 mg/kg to upwards of 8,000 mg/kg. However, due to the placement of the grid, several areas of the property were not sampled (e.g., areas along the central-eastern and southern property boundaries), and DDT sampling was not conducted at all grid nodes. The resulting sampling density does not define the lateral extent of DDT up to and beyond the property boundary, and is not adequate for purposes of developing remedial alternatives.

Additional soil samples were collected during the Northwest Corner Investigation and analyzed for DDT (McLaren-Hart, 1997). Elevated DDT concentrations were detected in several of the southernmost samples adjacent to the Jones property, and in the deepest samples from 11 borings.

Similarly, at near-Property locations including the Normandie Avenue Ditch and historical ponding area (eastern end of the LADWP right-of-way and Farmer Brothers property), elevated DDT concentrations have been detected at several locations.

In the area of the Normandie Avenue Ditch and historical ponding area, elevated DDT concentrations have been detected in numerous shallow soil samples (ranging from less than 1 mg/kg to over 7,000 mg/kg in the upper foot). Although soil samples were collected at depths up to 62 feet bgs in a small number of borings, soil was collected from shallow depths between 0 and 6 feet bgs at the majority of sampling locations. At 10 of the locations, the sample depth was not sufficient to vertically delineate the extent of DDT concentrations greater than 10 mg/kg or parts per million (ppm). These locations (**Figure 7**) and their respective DDT concentrations in the deepest samples (**Figure 8**) are summarized below. Two analytical results are available for 6 of the 10 borings, and both sets of laboratory results (Smith-Emery and Stauffer Chemicals) are provided below respectively:

- Boring SO27: 1,900 mg/kg at 2.2 feet bgs
- Boring 8-81-9: 2,500 and 1,883 mg/kg at 0 feet bgs (surface sample)
- Boring *2: 25 and 1,760 mg/kg at 0 feet bgs (surface sample)
- Boring 8-81-8: 1,100 and 927 mg/kg at 0 feet bgs (surface sample)
- Boring 11-81-5: 780 mg/kg at 0 feet bgs (surface sample)
- Boring *16: 28 and 360 mg/kg at 2 feet bgs
- Boring TO44: 66 mg/kg at 5.75 feet bgs
- Boring *6: 71 and 55 mg/kg at 2 feet bgs
- Boring SP003: 52 mg/kg at 5.5 feet bgs
- Boring *10: 0.66 and 31 mg/kg at 2 feet bgs

Both on- and near-Property, DDT is also of concern at various locations where it may have migrated deeper into native soil or to groundwater via transport mechanisms such as cosolvation mass transport (i.e., DDT dissolved in a solvent such as MCB). On-Property, DDT may have been transported to depth by:

- Potential releases from bulk chemical storage areas (e.g., the former gasoline tank and MCB/chloral tanks)
- Potential releases from waste storage tanks or the railcars along the train tracks
- Potential downward migration from areas of former ditches and ponding (e.g., east of the CPA and south to the Normandie Avenue Ditch and historical ponding area, and west of the CPA from the machine shop past the cooling towers and into the wastewater pond)
- Potential releases or leaks at former process areas

Because additional data are needed to adequately define the lateral and vertical extent of DDT, to better estimate soil volumes requiring remediation, and to conduct risk assessments for on- and off-Property areas, the following are objectives for additional DDT sampling.

DDT Characterization Objectives:

a) Further characterize the lateral and vertical extent of DDT in reworked and shallow native soil within the on-Property areas outside the CPA

b) Define the lateral and vertical extent of elevated DDT concentrations (at the property boundary and throughout adjacent properties) in shallow native soil

c) Characterize the depth of DDT contamination in areas of potential vertical migration through native soil down to groundwater, and evaluate the presence of contamination (or DNAPL) to 60-foot borings. In selected instances (see **Table 4**), continue characterization into the upper saturated zone (90-foot borings)

4.1.2 BHC

From approximately 1953 to 1962, Stauffer Chemical Co. operated a lindane and BHC research and manufacturing plant in the southeastern area of the Montrose Property. There is limited data available to characterize BHC isomers in soil from the area of the former Stauffer BHC pilot plant. In addition, demolition and grading of the Montrose Property could have mixed BHC, originally in soil beneath this area, during the reworking of shallow soil across the property.

The RI Report presents the majority of available BHC data (**Figure 9**). On-Property samples were collected on the same 200-foot grid as the DDT samples. Similarly, the density is not adequate for purposes of defining remedial actions, and the lateral and vertical extents of BHC on-Property are not defined.

Based on the RI Report, only one sample was available to characterize the upper 3 feet of on-Property soil in the central and eastern portions of the former plant property; this sample 35D (**Figure 7**), located in the area of the former BHC plant, contained 35.1 mg/kg of total BHC (**Figure 9**), exceeding the industrial PRG for alpha-BHC (0.36 mg/kg) by nearly 10 times. Total BHC is the sum of four individual isomers including alpha, beta, delta, and gamma-BHC. Unless the individual isomer concentrations are reported, it is not possible to distinguish if the alpha-BHC concentration is below the industrial PRG.

Approximately a dozen samples were collected at depths between 3.5 and 9.5 feet bgs (half were collected from soil shallower than 4 feet bgs). Six of these samples had results, or limits of detection, exceeding the industrial PRG for alpha-BHC. Elevated reporting limits for BHC resulted from the

sample dilution required for quantifying DDT concentrations at the Site; the elevated reporting limits were not a result of poor laboratory work.

BHC samples were also collected in the 1997 during the Northwest Corner Investigation. Sixty-two BHC sample results were reported; 29 of these had limits of detection exceeding the industrial PRG for alpha-BHC, and 3 samples, collected from the western area of the Montrose Property contained BHC at concentrations up to 250 mg/kg.

BHC also has been sporadically sampled for and detected (or limits of detection exceed the industrial PRG) in samples taken in the area of historical ponding associated with the Normandie Avenue Ditch. Elevated BHC concentrations were detected in samples collected from the upper 3 feet of soil; and, several samples collected from depths up to 6 feet bgs reported non-detectable Total BHC concentrations, but the limits of detection exceeded the industrial PRG for the alpha isomer.

In a manner similar to DDT, BHC may have migrated to deeper native soil by various transport mechanisms. In the Normandie Avenue Ditch and historical ponding area at sampling location TO34 (**Figure 7**), the majority of sample depths including the deepest samples (6 feet bgs) had BHC results of non-detect; however, the reported limits of detection for alpha-BHC exceed the industrial EPA Region IX PRGs by at least 7 times.

The lateral and vertical extents of BHC have not been defined adequately to conduct risk assessments for on- and off-Property areas, or to estimate soil volumes requiring remediation and evaluate the types of remediation technologies that may be needed. Additional BHC sampling is needed to address the data gaps and the objectives stated above. Analytical results should be provided for the alpha-, beta-, delta-, and gamma-BHC isomers. Limits of detection must be adequately sensitive to achieve (i.e., be below) the PRG for alpha-BHC, the most toxic BHC isomer and one of the isomers generated as waste in the production of the pesticide lindane (gamma-BHC).

BHC Characterization Objectives:

a) Characterize the lateral and vertical extent of BHC in the on-Property reworked and shallow native soil, particularly in the area of the former BHC plant.

b) Define the lateral and vertical extents of BHC concentrations at near-Property locations in shallow native soil where previous sampling results indicate concentrations or limits of detection exceed PRGs.

c) Characterize the depth of BHC contamination both on- and near-Property beneath areas of potential contaminant transport to depth (e.g., via cosolvation or hydraulic head transport) such as material storage areas, former ditches, and the area of ponding for the Normandie Avenue Ditch. Collect native soil samples down to 60 feet or 90 feet, as indicated.

4.2 ON- AND NEAR-PROPERTY VOLATILE ORGANIC COMPOUNDS

4.2.1 REWORKED AND SHALLOW-NATIVE SOIL

Soils have been sampled for VOC analysis and VOCs detected sporadically both on and near the Montrose Property, in the reworked and shallow native soil.

The 1998 RI Report presented the available data for characterization of VOCs including MCB (**Figure 10**), chloroform, benzene, tetrachloroethene (PCE), total dichlorobenzene, and other chemicals. On-Property soil was sampled for VOCs at the same 200-foot grid nodes as for DDT, from approximately 3 feet to 10 feet bgs. Within the CPA, sampling continued to greater depths, and to groundwater depth in several borings. In soil from the surface to approximately 7 feet bgs, chemical-specific industrial PRGs were not exceeded for these chemicals, with two exceptions. Dichlorobenzene was detected in a soil sample collected from east of the CPA at 34 mg/kg (industrial PRG of 7.9 mg/kg for 1,4-dichlorobenzene), and for PCE, the limits of detection were elevated significantly above the PCE industrial PRG of 3.4 mg/kg at various locations within and to the south of the CPA.

Beginning at approximately 7 feet bgs, concentrations (or limits of detection) significantly exceeded the chemical-specific PRGs in soil samples from borings located within the CPA. The first (shallowest) depth intervals having results exceeding the chemical-specific PRGs are:

- MCB - 7.2 feet bgs; 1,500 mg/kg (industrial PRG of 530 mg/kg)
- Chloroform - 9.5 feet bgs, 72 mg/kg (industrial PRG of 0.47 mg/kg)
- Benzene - 7.8 feet bgs, limit of detection of 120 mg/kg (industrial PRG of 1.4 mg/kg)
- PCE - 7.8 feet bgs, limit of detection of 60 mg/kg (industrial PRG of 1.3 mg/kg)
- Dichlorobenzene - 8 feet bgs, 35 mg/kg (industrial PRG of 7.9 mg/kg for 1,4-dichlorobenzene)

Within the CPA, some of these constituents (most notably MCB) continued to be detected at highly elevated concentrations to groundwater (**Figure 10**). Outside the CPA, the Montrose Property has not been adequately characterized for VOCs. Only five borings located on-Property but outside the CPA were sampled for VOCs. These borings are primarily located near the boundaries of the property. MCB was detected at low concentrations (84 micrograms per kilogram [µg/kg]) at depths greater than 40 feet bgs in these borings.

Soil samples collected from the Montrose and Jones properties during investigations by the California Department of Health Services (CDHS) also contained elevated concentrations of MCB, chloroform, carbon tetrachloride, trichloroethene (TCE) and dichlorobenzene (Levine-Fricke, 1995).

Additional VOC samples are needed both on-Property and near-Property in the reworked and shallow native soil: to assess the extent of Montrose-related chemicals; to confirm sampling conducted in the 1980s by the CDHS (for which exact sampling locations, and laboratory quality control procedures are not available); to better estimate soil volumes requiring remediation; to conduct a risk assessment; and to evaluate the types of remediation technologies that may be needed in these areas, if any.

4.2.2 NATIVE SOIL TO GROUNDWATER

Contamination may be present at depth where materials or wastes were used, stored, or transported. As described above, migration through the shallow soil to deep native soil may have resulted via leaks or where sufficient hydraulic head existed to drive contaminants to depth. If significant levels of contaminants are present, soil in these areas may be a historical source of NAPL contamination. Some areas of concern with regard to VOC contamination include:

- **Former Gasoline Tank**. According to the 1998 RI Report, an underground gasoline storage tank was located south of the machine shop, in the northwestern portion of the Montrose Plant Property. Soil at depth in this area could contain gasoline-related contaminants such as benzene,

toluene, ethylbenzene, and total xylenes (BTEX), and be a continuing NAPL source to soil or groundwater. There is a distribution of benzene in groundwater beneath the Montrose Site; and, additional investigation of potential benzene sources from the Montrose Property are necessary to assess contribution to the dissolved benzene plume defined in the March 1999 Groundwater Record of Decision [ROD] (EPA, 1999).

- **Former Ditches, Trenches, Railroad Tracks, and Aboveground Storage Tanks**. VOCs may be present in native soil beneath the ditches west of the CPA and/or wastewater-recycling pond as a result of transport to depth via cosolvation or hydraulic head pressure. Sources of VOCs in the ditches and pond include: potential spills or leaks to ditches draining to the wastewater pond; failed batches and/or acid process waters that were discharged to the wastewater pond; chloroform potentially generated during the caustic neutralization step of the DDT liquor; and, chloroform potentially generated from reaction of chloral hydrate (from chloral and water) with base in the wastewater pond.

  To the east of the CPA, chloral and MCB (raw materials for DDT production) were delivered to storage tanks in this area via tanker truck and railcar. Materials from spills, leaks, and runoff may have occurred at the delivery and storage areas.

  As a result, deeper native soil in material delivery, handling and storage areas, and beneath the ditches and trenches may contain VOCs including MCB, chloral hydrate (the hydrated form of the Montrose raw material chloral), and minor quantities of degreasers such as PCE. In addition, impurities present in raw materials and byproducts of the manufacturing process, such as dichlorobenzenes (known to be an impurity at 0.1 to 0.2 percent by weight, in the chloral-MCB mix) and chloroform, could also be present.

- **Former BHC Plant**. Potential spills of benzene from raw material storage and BHC production may have migrated to depth in the area of the former BHC plant. Benzene, if released to soil, may have also transported BHC (and potentially DDT, if present) by way of cosolvation. The RI Report indicates the presence of BHC in the Upper Bellflower Aquitard centered near the location of the former BHC plant. Sampling in this area is needed to assess the distribution and concentration range of VOCs (particularly benzene) in soil beneath the BHC Plant area (BHC is addressed separately).

- **Normandie Avenue Ditch and historical ponding area**. Surface runoff from the Montrose and Jones properties reportedly accumulated in the area of historical ponding along the Normandie Avenue Ditch. The ponding area was sampled in 1981 (during Montrose plant operations) by the Department of Health Services after a reported spill and after stormwater runoff had accumulated from the common ditch serving Montrose and Jones. MCB was detected in both liquid samples (up to 84% MCB in MC005) and soil samples (up to 2.5% MCB in MC006), along with elevated concentrations of DDT (up to 98 mg/kg in MC006). However, no MCB was detected in soil samples collected in 1985 from 3 locations along the Normandie Avenue Ditch and historical ponding area at depths between 11 and 62 feet.

In addition to the historical VOC soil data presented in the RI Report, a soil gas survey was conducted at the Montrose Property in 2003. Details regarding the soil gas survey approach and results were reported to EPA in the *Revised Soil Gas Survey Report* (Earth Tech, 2004); this report has not yet been approved by EPA. Soil gas samples were collected at depths of 5, 15, and 35 feet bgs and analyzed for VOCs. The highest VOC concentrations in soil gas were observed at the 35-foot depth. Maps of soil gas data from this depth are provided for MCB, chloroform, and PCE (**Figures 11**, **12**, and **13**, respectively).

A DNAPL reconnaissance investigation was also conducted at the Montrose Property in 2003. Details regarding this investigation were reported to EPA in the *Results of DNAPL Reconnaissance Investigation*

report (Hargis+Associates, 2004); this report has not yet been approved by EPA. DNAPL, consisting primarily of MCB, was observed in the central and eastern portions of the property as shown in **Figure 14**. This map indicates the presence of DNAPL in the saturated zone below the water table. The extent of DNAPL and VOCs in the unsaturated zone, based on data from the DNAPL reconnaissance borings, is shown in **Figure 15**.

VOC Characterization Objectives:

a) Sample for VOCs in the reworked (where present) and shallow-native soil, both on-Property (outside the CPA) and in the Normandie Avenue Ditch and historical ponding area, to define the lateral and vertical extent of VOCs in areas where they were used, may have been released to soil, or were detected in previous sampling events.

b) Beneath the identified potential source areas, sample for VOCs in native soil to depth to evaluate whether contamination (including NAPL) is present. Extend boring and sampling down to 60 feet bgs, and in selected locations, evaluate concentrations in the upper saturated zone (to 90 feet bgs).

4.3 ON- AND NEAR-PROPERTY METALS

Several metals require additional characterization, both on- and near-Property for the reasons discussed below. It is noted that, solely from a treatment technology selection standpoint, the presence of metals significantly above health-based levels could alter the feasibility study analysis. Most of the treatment technologies being considered for organics such as DDT and MCB would not treat metals, and additional remedial treatment elements would need to be added to address metals if concentrations are significant.

Lead, in one sample, and arsenic have been detected at concentrations exceeding industrial PRGs during soil sampling conducted at the Montrose Property (**Figure 16**). On-Property soil was sampled for metals at 17 boring locations on the same 200-foot grid nodes that were established for DDT sampling. 6 of the 17 borings (10 samples) were located in the reworked zone.

- Lead was detected on-Property at a maximum concentration of 999 mg/kg from a soil sample collected at a depth of 5 feet bgs in the south-central portion of the property. Only 1 of the 46 samples tested for lead exhibited a concentration above the industrial PRG (800 mg/kg, revised in October 2004).
- Arsenic was detected in 23 of the 46 samples collected on-Property at concentrations up to approximately 10 times the EPA benchmark concentration (10 mg/kg), primarily in the central and eastern portions of the property. However, the majority of these elevated results were "J" qualified, denoting that they are qualitatively correct (the metal is correctly identified), but the concentrations are approximate (occurred below reporting limit but above method detection limit [MDL]). These samples were J-flagged due to matrix interference (matrix spike recovery was greater than the laboratory quality control limits). These J-flagged samples have significantly higher arsenic concentrations than other on-Property samples or those from surrounding areas, and therefore require verification through additional sampling.

In recent years, regulatory agencies have given renewed attention to cooling tower operations and the possible environmental impacts from the past use of corrosion and biological inhibitors containing metals such as hexavalent chromium. The former Montrose plant had a cooling tower to refrigerate ammonia

brine, which controlled the temperature of the condensors (DDT formation vessels). The cooling towers were located just west of the CPA. Total chromium, and more specifically hexavalent chromium, may have been released to the environment from past cooling tower operations. An open ditch drained surface runoff from the area of the maintenance shop past the cooling tower to the wastewater settling pond.

The possibility of chromium, in soil around the cooling towers or in the ditches due to runoff has not been previously evaluated for the Montrose Superfund Site. In the grid-based sampling, chromium was not detected at concentrations exceeding the industrial PRG for total chromium (450 mg/kg) in any samples; and only one sample (located east of the CPA at 3.5 feet bgs) had a detected total chromium concentration of 89 mg/kg in boring 15D (**Figure 16**), exceeding the industrial PRG for hexavalent chromium (64 mg/kg). However, only one grid sample was collected from within 200 feet of the former cooling tower location; boring 13D, located northwest of the tower (see **Figure 7** for previous boring locations). Undisturbed soils beneath the cooling tower, the former ditch, and the wastewater recycling pond have not been analyzed for chromium. Runoff in the ditches or pond may have provided a source of contamination and sufficient head to drive soluble contaminants below the depth of the rework/native interface.

Additional sampling is needed for these three metals (arsenic, lead, and chromium) on- and near-Property to provide greater sample density, to further delineate areas having elevated metals concentrations, and to characterize deeper soils for metals transported to depth.

While most cleanup options considered in the *Montrose Superfund Site Soil Feasibility Study* (Earth Tech, 1999; not approved by EPA) have focused on treatment technologies for DDT, the presence of metals at elevated levels in on- and near-Property soil could impact the evaluation of appropriate or additional treatment trains.

The following objectives were developed to further characterize these metals in both on- and near-Property soil. This data will be used: to better delineate the extent of previously detected metals in soil; to compare previously detected on-Property levels to those in the native zone and other areas of the Montrose Property; to assess whether the concentrations are anthropogenic or naturally occurring; and to provide data to support the human heath risk assessment for the Montrose Site; to estimate soil volumes requiring remediation to address metals (if any); and, to identify remedial alternatives (if needed), which may differ from those selected for other contaminants such as DDT.

Metal Characterization Objectives:

a) Collect soil samples to further characterize the levels and extent of arsenic, lead, and chromium (and hexavalent chromium, if necessary) in reworked and shallow native soil on- and near-Property, and to provide data to support the human heath risk assessment for the Montrose Site. A separate field sampling plan for the Jones property will be prepared as an addendum to this revised FSP.

b) Determine whether and to what extent arsenic, lead, and chromium (and, if present, hexavalent chromium) exist in the soil under historical use and source areas, where vertical migration could be facilitated by migration of other constituents, such as: near the cooling tower, in ditches and the former wastewater recycling pond, beneath ditches and source areas east of the CPA, and in the area of the Normandie Avenue Ditch and historical ponding area.

4.4 OFF-PROPERTY PESTICIDE DATA

Industrial/commercial properties near the Montrose Property were not addressed fully by previous RI activities, and thus require additional sampling to characterize the extent of potential pesticide contamination for the purposes of the off-Property risk assessment and FS estimating of soil volumes requiring remediation. Additional pesticide characterization data are needed for the LADWP right-of-way and Farmer Brothers properties, the Business Area East of Normandie Avenue, and the Western Waste parcel. The easternmost area of the LADWP right-of-way and Farmer Brothers properties, including the Normandie Avenue Ditch and historical ponding area are addressed in this revised FSP as on- and near-Property areas because they are located within the historical stormwater pathway. Data needs and objectives for these off-Property areas are described below.

4.4.1 LADWP RIGHT-OF-WAY

Adequate data are not available to characterize those portions of the LADWP right-of-way south and southwest of the Montrose Property. Sampling and analysis are needed to determine the extent of contamination laterally and vertically in shallow soil, to complete a risk assessment, and for FS evaluation. Data collected in September 1986 by Hargis+Associates (RI Report, EPA 1998) identified DDT in shallow soils east of the Jones access road and south of the electrical substation, up to 630 mg/kg in boring LAO13 (collected at 1.25 feet) and at 120 mg/kg in the deepest sample (3 feet) collected from boring LAO16 (see **Figure 7** for previous boring locations and **Figure 8** for historical DDT concentrations in soil). Also, results from some of the historical BHC samples were reported as not detected with limits of detection exceeding the industrial PRG for alpha-BHC.

Off-Property Pesticide Characterization Objectives - LADWP Right-of-Way Property:

a) Provide pesticide data (particularly isomers of DDT and BHC) to characterize areas with lower sample density, to bound the areas of elevated DDT and/or BHC concentrations, and to fill in data gaps for areas where detection limits for BHC were elevated.

4.4.2 FARMER BROTHERS PROPERTY

Much of the Farmer Brothers property adjacent to the LADWP right-of-way is unsampled for DDT and BHC. In the southeastern area of the property, soil samples were collected in 1994 by McLaren Hart (McLaren Hart, 1997) from 1-foot bgs (samples FB-S1 through FB-S10); total BHC was detected (up to 4.6 mg/kg), and where total BHC was reported as not detected, the associated limits of detection were significantly above the industrial PRG of 0.36 mg/kg for a-BHC (ranging from 3.8 to 76 mg/kg). Also, areas adjacent to where elevated DDT was detected on the LADWP property have not been fully delineated (see **Figure 7** for previous boring locations and **Figure 8** for historical DDT concentrations in soil).

Based on the RI (1998) report, further expansion and construction activities at the Farmer Brothers property over the past 10 years (since 1994) have substantially changed the accessibility of some soil sampling locations. Since the sampling effort that identified elevated total BHC samples in the southeastern area of the property, a building has been constructed over where these samples were located.

Off-Property Pesticide Characterization Objectives - Farmer Brothers property:

a) Collect samples and analyze for pesticides (particularly DDT and BHC isomers) to characterize areas with lower sample density, to identify boundaries of the DDT and BHC findings on the adjacent LADWP property, and to further characterize the extent of BHC around the building constructed in the area of previous BHC findings.

4.4.3 BUSINESS AREA EAST OF NORMANDIE

The business area across Normandie Avenue from the Montrose Property is generally downwind of the Montrose Property, and pesticides were potentially transported by aerial dispersion during former plant operations such as DDT grinding and formulation. This business area was previously sampled by Montrose in 1981 and by Ecology and Environment in September 1986. Soil samples collected in 1981 from planted areas along Normandie Avenue, directly east of the Plant Property, were found to contain up to 1,940 mg/kg of total DDT (Stauffer Chemical, 1981). A dust wipe sample from within a building at the east end of Jon Street contained 266.3 mg/kg total DDT, and a soil sample from that same parcel contained 126.3 mg/kg total DDT; soil samples collected along Francisco Street, had total DDT values from 25.1 to 53.8 mg/kg (Ecology and Environment, 1986). Additional samples to characterize the extent of DDT contamination in soil both around these properties and in the greater business area have not been collected.

Additional data are necessary to assess the extent of contamination, to support a risk assessment, and to better estimate soil volumes requiring remediation. If Montrose-related contaminants are detected but not adequately characterized for HHRA purposes (e.g., sampling density and/or variability in contaminant concentrations) by the proposed sampling, additional sampling may be required.

Off-Property Pesticide Characterization Objectives - Business Area East of Normandie:

a) Collect samples and analyze for pesticides to better characterize soil throughout this area, to provide data adequate for risk assessment purposes, and to delineate boundaries around the locations where DDT was previously detected. The sampling should focus on the first several feet of native soil because mechanisms that may have resulted in contaminant transport to deeper subsurface soil are not known to be present in these areas.

4.4.4 WESTERN WASTE PARCEL

Historical city and county sewer maps of the Montrose area indicate that surface water runoff from the west side of Normandie Avenue historically flowed across Normandie Avenue at two locations (over different time periods):

- Via a 24-inch diameter vitreous clay pipe that crossed Normandie Avenue at 204th Street.
- Via an 18-inch diameter corrugated iron pipe that crossed to the area now referred to as the Western Waste parcel (located north of Del Amo Alley). Surface water moving through the 18-inch corrugated iron pipe would have entered the unimproved channel on the Western Waste parcel (visible in aerial photographs of this area from the 1940s and early 1950s) and continued to the Kenwood Ditch.

Aerial photographs of the Western Waste parcel also indicate that soil was frequently reworked over the course of decades, which could have resulted in shallow contamination, if present, being mixed to greater depths in some areas.

The swale or unimproved channel, shown in **Figure 2**, transported surface water from the Business Area east of Normandie Avenue, through the Western Waste parcel, south of the Del Amo Alley, and into the Kenwood Ditch, which was replaced by a drain in the late 1960s and early 1970s. Between 1999 and 2002, EPA conducted an investigation and removal action to remove DDT-contaminated soils associated with the portion of the historical ditch from the Del Amo Alley to Torrance Boulevard.

The Western Waste parcel is also east and downwind of the Montrose Property; pesticides were potentially transported here by aerial dispersion during former plant operations such as DDT grinding and formulation. Montrose used WRH Industries, owners of the Western Waste parcel, to remove process waste from the Montrose Property from 1961 through plant closure. The nature of the process waste is not known and the property is currently used for temporary storage of municipal trash bins. Potential aerial dispersion, surface runoff from areas north and west of the parcel, and handling of Montrose process wastes, along with reworking of the soil, could have resulted in contamination in both surface and shallow native soil.

Sampling of soil in the Western Waste parcel is proposed to further characterize the extent of pesticide contamination resulting from aerial dispersion, surface water transport and deposition (prior to entering the historical Kenwood Ditch), and/or handling of wastes and soil reworking, and to provide data for completing a HHRA for pesticides detected at the Western Waste property. Sampling will address native soil to several feet deeper than is conducted in the Business Area, due to the presence of the swales and reworking of soil that could have resulted in contaminant mixing to greater depths. This data will be used to assess the extent of contamination, to support a risk assessment, and to better estimate soil volumes requiring remediation (if any). If the sampling provided in this revised FSP for the Western Waste area indicates that pesticide concentrations in soil have not been adequately delineated vertically or laterally, and/or areas that may pose an unacceptable risk do not have the necessary density of samples to determine an exposure concentration, as required by EPA's guidelines for HHRA, then more sampling may be required to meet these objectives.

Off-Property Pesticide Characterization Objectives - Western Waste Parcel:

a) Collect samples of native soil throughout this parcel and in the area of the former surface water drainage ditch(es) to the depth of potential rework or impact and analyze for DDT and BHC to provide data adequate for risk assessment purposes and FS tasks.

5.0 SAMPLING APPROACH AND RATIONALE

This section identifies the area- and analyte-specific sampling to be conducted, including the analytical methods, sample numbers and locations, and sample depths for the soil sampling needed to meet the objectives presented in Section 4.0.

5.1 OVERVIEW OF OBJECTIVE-SPECIFIC PROTOCOLS

Protocols have been developed to facilitate meeting the objectives specified in Section 4.0 (hereafter referred to as objective-specific [O-S] protocols). These protocols are presented below.

More than one O-S protocol may be assigned to a particular boring location, if data from one location needs to meet more than one objective. The depths from which samples will be collected within a boring are presented for each of the O-S protocols.

The borings subject to the various O-S protocols are identified in **Figure 26,** and are described in Section 5.3.

5.2 OVERVIEW OF PESTICIDE ANALYSES

Samples collected for pesticide analysis will be analyzed for DDT and BHC at an off-site laboratory. Analysis for DDT and BHC will be conducted using SW 846 procedures for EPA Method 8081A, and shall evaluate and report all method analytes, including the isomers of DDT and BHC. DDT isomers (4,4'-DDE; 4,4'-DDD; 4,4'-DDT; 2,4'-DDE; 2,4'-DDD; and 2,4'-DDT) will be presented individually in the data report, as well as summed and reported as total DDT. Analytical results for BHC will also distinguish the isomers (alpha-BHC, beta-BHC, delta-BHC, and gamma-BHC, the latter is known as lindane), and will report results for both the individual isomers and total BHC (the sum of the concentrations of these isomers).

5.3 OBJECTIVE-SPECIFIC PROTOCOLS

For all on-Property sampling, the depth of the interface of reworked and native zones is of significance. Therefore, the depth at which this interface occurs in each on-Property boring, if discernable, will be noted in the field, logged, and reported.

Tables 2 and **3** summarize the sampling requirements for the on- and near-Property and the off-Property O-S protocols, respectively. In **Table 2**, the protocols are organized by analyte type (pesticides, VOCs, and metals) and by depth of the boring (shallow, deep 60 and 90-foot borings). For this sampling plan, shallow borings are defined as borings advanced into the reworked material (if present) and shallow native soil to a depth of either 10 or 15 feet bgs. Deep borings are defined as borings advanced through the reworked material into the native soil extending to either 60 feet bgs or in some cases 90 feet bgs. The footnotes associated with each analyte in **Table 2** describe which analytical methods will be used. **Table 3** provides a similar approach for off-Property sampling.

In **Figure 26**, sampling requirements and O-S protocols are shown using a color-coded system. Shallow and deep borings are shown as light blue or black hexagons, respectively. The proposed 90-foot deep

borings are shown as black hexagons with a dashed red circle around them. Four previously completed 90-foot deep borings (C-48, 51, 52, and 56) are shown as black hexagons with a dashed blue circle around them. Target analytes are shown as color-coded triangles within each hexagon. VOCs, metals, DDT, and BHC are shown as red, green, blue, and purple triangles respectively. As an example, Boring C-3 in **Figure 26** is a light blue hexagon containing red, green, blue and purple sections. This means that this boring is a shallow boring and samples will be analyzed for VOCs, metals, DDT, and BHC.

5.4 SAMPLING LOCATIONS

The sampling locations presented in this section correspond to the data needs and the revised FSP objectives presented in Section 4.0 as well as the O-S protocols presented in **Tables 2** and **3**. Several of the proposed soil borings address more than one of the rationales listed below. **Figure 26** shows the locations of the 148 proposed soil borings, including 116 shallow borings, 26 deep borings to 60 feet bgs, and 6 deep borings to 90-feet bgs. The sampling of four additional 90-foot borings (C48, C51, C52 and C56) was completed prior to June 2004 (10 total 90-foot borings).

5.4.1 ON- AND NEAR-PROPERTY PESTICIDES

5.4.1.1 Characterization of DDT

Shallow Soils: To meet the objectives for DDT sampling in shallow soil (increasing sampling density and defining the extent of DDT), samples will be collected from 19 on-Property and 13 near-Property borings, as shown in **Figure 17**. These samples will be collected and laboratory analyzed by EPA Method 8081A according to the On- and Near-Property Pesticide Protocols for Shallow Borings presented in Section 5.3, **Table 2**.

Deep Soils: To characterize areas where DDT may have migrated to deep native soil and to assess for the presence of NAPL, samples will be collected from 20 on-Property and two near-Property (Normandie Avenue Ditch and historical ponding area) deep boring, in accordance with Pesticide Protocols for Deep Borings (Reworked and Native Soil to 60 feet bgs). Additionally, 6 on- Property 90-foot bgs borings (as identified in **Figure 17** and **Table 4**) will be advanced and sampled in accordance with Pesticide Protocols for 90-foot Deep Borings.

5.4.1.2 Characterization of BHC

Shallow Soils: To better characterize reworked and shallow native soil for BHC [BHC Characterization Objectives (a) and (b)], 22 on-Property and 12 near-Property borings will be sampled for BHC, as shown in **Figure 18**. The samples shall be collected and analyzed by EPA Method 8081A according to the On-Property Pesticide Protocols for Shallow Borings (Section 5.3, **Table 2**).

Deep Soils: Additional BHC sampling to characterize deeper native soil near potential source areas [BHC Characterization Objective (c)] will be conducted at 20 on-Property borings and two near-Property boring, in accordance with the Pesticide Protocols for 60-foot Deep Borings. Additionally, 6 on- Property 90-foot bgs borings will be advanced and sampled in accordance with Pesticide Protocols for 90-foot Deep Borings (**Figure 18**).

5.4.2 ON- AND NEAR-PROPERTY VOLATILE ORGANIC COMPOUNDS

Shallow Soils: Samples will be collected from 11 borings on-Property and 2 near-Property boring locations to evaluate the reworked zone and shallow native soil for the presence of VOCs [VOC Characterization Objective (a)]. These samples will be collected and analyzed by EPA Method 8260B according to the On-Property VOC Protocols Shallow Borings (**Table 2**). Proposed sampling locations are shown in **Figure 19**. There are 6 additional borings (C12, C19, C28, C37, C47, and C53), identified as near-Property that will be sampled for VOCs if the flame ionization detector (FID)/photoionization detector (PID) headspace readings are elevated. The primary objective for these 6 borings is delineation of pesticides and metals, but the samples will additionally be analyzed for VOCs if warranted based on field observations.

Deep Soils: To address VOCs in the reworked zone and native soil to 60 feet or to 90 feet [Characterization Objective (b)], on- and near-Property borings will be sampled at the following areas, in accordance with the On- and Near-Property VOC Protocols for Deep Borings (see **Table 2**):

- **Former Underground Gasoline Tank** – A soil boring cannot be advanced directly in the footprint of the former tank, because a containment cell holding soil from the Kenwood Stormwater Drainage Pathway removal action is situated partially over the location of the former gasoline storage tank. Therefore, a boring (C13) will be located and advanced as shown in **Figure 19** – Boring C13 is proposed at approximately 17.5 feet from the tank.
- **Former Ditches, Trenches, Railroad Tracks, and Aboveground Storage Tanks** - Samples will be collected from 27 on- and near-property boring locations to address VOCs in soil from potential releases to ditches, trenches, railroad tracks, the wastewater treatment pond, and from aboveground storage tanks east of the CPA, as shown in **Figure 19**.
- **Former BHC Plant** - 2 soil borings (C57, C59) will be advanced and sampled from the area of the former BHC plant as shown in **Figure 19**. One of these borings also will be used to characterize the railroad tracks in the southeast portion of the property (see Ditches, Trenches, Railroad Tracks, and Storage Tanks, above). Prior to June 2004, 4 deep soil borings (C48, C52, C52, C56) were drilled by Hargis + Associates to 90-feet bgs in the vicinity of the former BHC plant.
- **Normandie Avenue Ditch and historical ponding area** – Soil samples will be collected from one boring (C98) located in areas of the historic ditch and ponding areas, as shown in **Figure 19**.

The locations of proposed VOC soil borings relative to the 2003 soil gas survey points and concentration data (MCB, chloroform, and PCE) are shown in **Figures 20**, **21**, and **22**, respectively. The locations of proposed VOC soil borings relative to the 2003 DNAPL reconnaissance borings and DNAPL extent in the saturated zone are shown in **Figure 23**. The locations of proposed VOC soil borings relative to the DNAPL extent in the unsaturated zone are shown in **Figure 24**.

5.4.3 ON- AND NEAR-PROPERTY METALS

Shallow Soils: To characterize metals in reworked and shallow native soil [Metals Characterization Objective (a)], 20 on-Property borings and 13 near-Property borings (including the Union Pacific Railroad right-of-way immediately east of the Montrose Property) will be collected and analyzed in accordance with the On- and Near-Property Metals Protocols for Shallow Borings (see **Table 2**). Sampling locations are shown in **Figure 25**.

- **Normandie Avenue Ditch and historical ponding area including** - Seven samples will be sampled for metals including from two 10-foot borings (C71, C76) located in the area of the ditch and historic ponding areas, and 5 borings (C75, C92, C101, C105, and C109) to 10-feet directly west of the ponding area as shown in **Figure 25**.

Deep Soils: To address metals that may have migrated to deeper native soil (Metals Characterization Objective [b]), the following on- and near-Property borings will be sampled to 60 or 90-feet bgs in accordance with the On- and Near-Property Metals Protocols for Deep Borings (see **Table 2**):

- **Northwest Corner** – One boring (C1) will be sampled for metals

- **Former Cooling Tower, Ditches, and Wastewater Recycling Pond at the CPA** - Currently, only the eastern edge of the former location of the cooling tower is accessible for sampling; a temporary containment cell holding soil from the Kenwood Stormwater Pathway Avenue removal action is located above and to the west of the former cooling tower. Therefore, the boring (C21) is located next to the former location of the cooling tower, straddling the former ditch. An additional 3 borings will be advanced within the CPA, one boring (C22) along the former ditch leading from the cooling tower area to the wastewater recycling pond in the CPA, and two borings (C26 and C31) adjacent to the former wastewater pond.

- **Former Underground Gasoline Tank** - One deep boring in this area (C13) will be sampled for metals.

- **Ditches and Other Source Areas West, South and East of the CPA** – Nine additional borings will be sampled for metals (C29, C35, C42, C44, C54, C60, C61, C64 and C65).

5.4.4 OFF-PROPERTY PESTICIDES

Samples will be collected from shallow native soil at each of the following areas to meet the identified Off-Property Pesticide Characterization Objectives. Sampling protocols for these areas are presented in **Table 3**.

- **LADWP Right of Way** - To characterize areas with lower sample density and delineate areas with pesticide concentrations exceeding benchmarks, 11 borings will be sampled for both DDT and BHC isomers; and 2 borings (C73 and C74) will be sampled for BHC only. One boring (C70) will be analyzed for DDT only. Soil samples will be collected to a depth of 6 feet bgs and analyzed by EPA Method 8081A in accordance with the Off-Property Pesticide Protocols for LADWP/Farmer Brothers (see **Table 3**). The proposed soil sampling locations are shown in **Figure 17**.

- **Farmer Brothers Property** – 17 borings will be sampled for both DDT and BHC isomers; and one additional boring (C108) will be sampled for BHC only. Samples will be collected to a depth of 6 feet bgs and all analyzed by EPA Method 8081A in accordance with the Off-Property Pesticide Protocols for LADWP/Farmer Brothers (see **Table 3**). Sampling locations are shown in **Figure 17**.

- **Business Area East of Normandie** - The area-specific objectives for this area are to characterize pesticides in soil that has historically be exposed to potential aerial dispersion effects, and to delineate locations previously found to have DDT concentrations in excess of benchmarks. Therefore, 17 borings are located in areas of historically exposed soil and outside of building footprints. Soil borings will be advanced to a depth of 2 feet bgs and sampled for DDT and BHC by EPA Method 8081A in accordance with the Off-Property Pesticide Protocols for LADWP/Farmer Brothers (see **Table 3**).

- **Western Waste Parcel** - To characterize soil within the parcel and in the adjacent LADWP right-of-way to the north, 12 borings located in the rework area north of the U-shaped railroad spur will be advanced and sampled to 8 feet bgs. 9 borings located east of the drainage swales north of the U-shaped rail spur will be advanced and sampled to a depth of 4 feet bgs. Four borings located in the southwestern of the U-shaped rail spur (locations are shown in **Figure 17**) will be advanced and sampled to a depth of 6 feet bgs. Borings will be sampled and analyzed in accordance with the Off-Property Pesticide Protocols specific to the Western Waste parcel (see **Table 3**).

6.0 REQUEST FOR ANALYSES

Tables 4, 5, and **6** present the request for analyses for soil, total sample count, and aqueous quality assurance/quality control (QA/QC) samples, respectively. The following requests will be made of the laboratory:

- All analytes detected by broad suite EPA Methods 8260B and 8081A will be reported
- Samples submitted for DDT analysis shall be analyzed for all isomers of DDT, including 4,4'-DDE; 4,4'-DDD; 4,4'-DDT; 2,4'-DDE; 2,4'-DDD; and 2,4'-DDT. Samples submitted for BHC analysis shall be analyzed for all isomers of BHC, including alpha-BHC, beta-BHC, delta-BHC, and gamma-BHC (lindane). The laboratory will report both the individual isomer concentrations and the sum of the isomers (total DDT and total BHC).
- Special handling will be requested for the BHC analysis to address the BHC isomers (alpha-, beta-, delta, and gamma-BHC).
- The laboratory will homogenize soil samples prior to analysis for metals and pesticides. This same procedure will not be possible for VOC samples because of the need to preserve the sample integrity.
- A turnaround time of two weeks will be requested for total chromium results so that the sample can also be analyzed for hexavalent chromium (EPA method 7199) if the total chromium results are above the industrial PRG for hexavalent chromium (64 mg/kg). **Table 7** provides sample containers, holding time, and preservative requirements for each analyte group.
- EPA and Montrose are evaluating alternate analytical methods for chloral hydrate, which is listed as a poor purger under EPA Method 8260B. Identification of an analytical approach for this site-related chemical will be documented separately and may require an amendment to the revised FSP.

7.0 FIELD METHODS AND PROCEDURES

7.1 SOIL BORING LOCATIONS

A certified land surveyor will identify the locations of sample borings. The coordinates will be generated using **Figure 26**, which is based on a georeferenced aerial image. Coordinates for each boring location will be identified using this figure and provided to the surveyor in UTM, Zone 11, NAD 1983 coordinate system. Soil sampling locations will be surveyed to the nearest 0.05-foot, and ground elevations (in feet above mean sea level) will be recorded. The surveyed control information for data collection points will be recorded and displayed in a table. The survey results table shall give the easting (X) and northing (Y) coordinates in UTM, Zone 11, NAD 1983 coordinate system and the ground surface elevation.

All boring locations will be cleared for underground utilities by notifying Underground Service Alert. A geophysical utility clearance may be conducted prior to advancing the borings in selected areas where there is a high potential for buried pipelines, debris, or other obstructions (**Figure 27**).

7.2 DRILLING AND SAMPLE COLLECTION

Sampling activities include collecting soil using a direct-push rig, hollow-stem auger rig, roto-sonic rig, and/or hand auger. A direct-push drill rig will be used for soil sample collection from shallow soil borings and deep 60-foot borings (if feasible). If the direct-push rig is unable to reach the 60-foot sample depth, then a hollow-stem auger rig will be used to advance and collect samples from the deep borings. Hand-auger sampling will be necessary to collect samples at some of the near- and off-Property locations where rig access is limited. In accordance with the methodology used for the DNAPL reconnaissance program, a roto-sonic drill rig will be used for soil sample collection from the deep 90-foot borings.

If the drilling equipment encounters refusal due to subsurface obstruction materials such as concrete debris or buried footings, a second attempt will be made 5 feet in an appropriate lateral direction. Additional attempts will be made up to 15 lateral feet until either the borehole is advanced or refusal has been met three consecutive times (at which point, EPA will be consulted).

Soil borings will be logged for lithology during drilling, and the reworked-native interface (where detectable) noted in the field log. After sample collection, each boring will be backfilled with neat cement grout or bentonite-cement grout placed from the bottom of the boring to the top using tremie pipe or equivalent. The end of the tremie pipe will remain submerged within the grout mixture at all times during placement, and the grout mixture will be introduced in each borehole in one continuous operation. In areas overlain by asphalt or concrete, the destroyed boring will be capped to match the existing grade using concrete or black-dyed concrete (for asphalt surfaces). For the deep on-Property soil borings (i.e., 60 to 90 feet bgs) installed within or adjacent to the area of known or possible DNAPL, heat-resistant cement (i.e., a neat cement silica flour mixture) will be used to backfill these deep borings, which may be subjected to a thermal remediation approach (currently under evaluation as part of the DNAPL FS). In the business area east of Normandie Avenue, the shallow hand-auger borings will be backfilled with sand and re-surfaced using either potting soil or grass sod to match pre-existing conditions.

7.2.1 DIRECT-PUSH SAMPLING

Direct-push drilling methods have previously achieved target depths of 90 feet bgs at the Montrose property. Consequently, this drilling method will be the primary method used for collection of soil

samples during implementation of the revised FSP. The direct-push sampler will contain stainless steel sleeves. The sleeves contained within the sampling rod will be pushed directly into the soil at the predetermined target depth. The lead sleeve will be submitted for laboratory analysis and the adjacent sections will be used for lithologic logging and FID/ PID field screening. If the soil sample will be analyzed for VOCs, the sample will be handled in accordance with EPA Method 5035, using Encore™ or equivalent sample containers. After the VOC sample is collected (or for samples with no VOC analysis), the sleeve will be sealed properly on both ends with Teflon tape and caps, labeled, sealed with custody seals, placed in a re-sealable plastic bag, and immediately placed in a cooler with ice for shipment to a certified laboratory for analysis. The laboratory will be instructed to homogenize the sample prior to selecting a portion for analysis. No drill cuttings will be generated during this process except for some logged soil.

7.2.2 HOLLOW-STEM AUGER SAMPLING

Previously, the dense sands located between approximately 25 and 50 feet bgs at the Montrose property have proven the most difficult for boring advancement using direct-push methods. If direct-push methods are unable to advance the deep borings to their target depth of 60-feet bgs, then hollow-stem auger drilling methods will be used for soil sample collection from these deep borings. As the boring is drilled, soil samples will be collected using a California-modified split-spoon sampler.

The California-modified split–spoon soil sampler will be lined with three 2-inch-diameter by 6-inch-long stainless steel sleeves. The soil sampler will be driven into the subsurface soils using a 140 pounds slide hammer with a 30-inch vertical drop. The soil samples will be extruded from the sleeve for lithologic observation.

When collecting soil samples for chemical analysis, the lead sleeve will be covered with Teflon squares, capped, and labeled. If the soil sample will be analyzed for VOCs, the sample will be handled in accordance with EPA Method 5035, using Encore™ or equivalent sample containers. After the VOC sample is collected (or for samples with no VOC analysis), the sleeve will be sealed properly on both ends with Teflon tape and caps, labeled, sealed with custody seals, placed in a re-sealable plastic bag, and immediately placed in a cooler with ice for shipment to a certified laboratory for analysis. The laboratory will be instructed to homogenize the sample prior to selecting a portion for analysis. The remaining two sleeves will be retained for lithologic logging and PID/FID field screening.

7.2.3 HAND AUGER SAMPLING

Some sampling locations are inaccessible to either the direct-push or hollow-stem auger rigs. At these locations, a hand auger will be required for soil sampling. Each hand-auger boring shall be advanced by manually rotating a hand auger, equipped with 3-inch-diameter cylindrical stainless-steel bits, until the auger head fills with soil cuttings. The hand auger is then pulled out from the boring, and the soil cuttings will be deposited on plastic sheeting. The hand augering is continued until the sampling depth is achieved.

At the predetermined sampling depth, a manually powered sliding hammer is used to drive a sampler containing a single 6-inch long stainless steel sleeve, into the ground. The sampler will be driven into the bottom of the boring to a depth of 6 inches, or until refusal is encountered. The sampler is then retrieved, and the recovery is determined by estimating the percentage of the sample in the stainless steel sleeve.

If the soil sample is to be analyzed for pesticides or metals, the sleeve will be handled and preserved in accordance with EPA Method 8081A. The sleeve will be sealed properly on both ends with Teflon tape

and caps, labeled, sealed with custody seals, placed in a re-sealable plastic bag, and immediately placed in a cooler with ice for shipment to a certified laboratory for analysis. The certified laboratory will be instructed to homogenize the soil sample prior to selecting a portion for analysis.

If the soil sample is to be analyzed for VOCs or field-screened for VOCs, soil samples will be immediately collected from the end of the sleeve where soil is exposed in accordance with EPA Method 5035, using Encore™ or equivalent sample containers. Following sampling, the remainder of the soil will be emptied from the sleeve into a re-sealable plastic bag for field screening as indicated in Section 7.2.5. For borings located along the eastern boundary of the Montrose property (C12, C19, C28, C37, C47, and C53), the Encore™ sample will be submitted to the laboratory for VOC analysis if the associated headspace concentration exceeds 10 parts per million by volume (ppmv). Following field screening, the lithology of the soil in the plastic bag will be described and recorded on a boring log.

If the soil sample is to be analyzed for VOCs and other constituents (pesticides or metals), then separate sleeves will be collected to facilitate the VOC field screening process. The first sleeve collected will be analyzed for pesticides, metals or both. A second sleeve will be collected immediately following the first for purposes of VOC sampling and field screening.

7.2.4 ROTO-SONIC SAMPLING

During the DNAPL reconnaissance program (Hargis+Associates, 2004), roto-sonic drilling methods were found to have superior performance in terms of sample recovery from the upper saturated zone versus direct-push methods. Consequently, roto-sonic methods will be used in an identical manner for the deep 90-foot borings. During advancement of the boring, a continuous 4-inch diameter core will be recovered from the drill stem in 2-foot lengths. Each core is immediately placed in a plastic sleeve and closed prior to field screening and sample collection. The top and bottom depths of the core will be labeled.

VOC soil samples will be collected using EPA 5035 methods (EnCore™ samplers or equivalent containers) at the specified sample depth immediately after retrieving the core, and prior to collecting other samples or conducting field screening. To access the core material for sampling, the plastic sleeve will be cut open along its entire length, and the soil samples collected at the target depths from the center of the core material. Sampling from the inside of the core is necessary to avoid sampling core wall soils that may have been affected by the drilling. Disturbance of the core material prior to and during VOC sampling will be minimized in order to preserve the validity of the soil samples (minimize VOC loss during sampling process).

Following field screening and collection of DNAPL-impacted soil samples (if observed), pesticide or metals soil samples will be collected at the planned sampling depths from the center of the core material using a hand trowel and placed in laboratory-supplied glass jars. The jars will be capped, labeled, sealed with custody seals, placed in a re-sealable plastic bag, and immediately placed in a cooler with ice for shipment to a certified laboratory for analysis. The laboratory will be instructed to homogenize the sample prior to selecting a portion for analysis. The remaining core materials will be used for lithologic description.

7.2.5 FIELD SCREENING

Soil samples collected from borings will be field screened for VOCs using an FID as well as a PID, and both subjected to the PID-related decisions. These field instruments will be calibrated daily in accordance with the manufacturer's instructions (hexane or isobutylene). The soil sample will be disaggregated into a re-sealable plastic bag that will be sealed. After the soil is allowed to volatilize for approximately 5 to 10

minutes in the bag, the bag will be pierced with the probes, and the concentration of VOCs in the headspace of the sample will be measured and recorded in the boring log.

Additional field screening procedures will be used for the borings drilled using roto-sonic techniques, in accordance with the methodology employed during the DNAPL reconnaissance program. Roto-sonic cores will be continuously logged and all core samples screened for the presence of DNAPL using FLUTe® ribbon. This ribbon was successfully used to detect the presence of separate-phase DNAPL during the reconnaissance program. The core material will be closed around the FLUTe® ribbon to ensure good contact between soil and ribbon. After approximately 5 minutes, the ribbon will be removed for inspection. A color change in the ribbon will be recorded at the respective sample depth, if observed. Additionally, FID/PID field screening will be conducted at least once on each core interval (2- to 5-foot intervals).

Field screening indicators for the possible presence of DNAPL include visual observation of DNAPL, staining of the FLUTe® ribbon, and/or FID/PID readings greater than or equal to 1,500 ppmv. If field screening indicates the possible presence of DNAPL outside the currently defined area of "known DNAPL" (as referenced in the Hargis + Associates investigation report), additional VOC and pesticide soil samples will be collected at the depth of DNAPL observance. These samples are in addition to the planned sampling depths indicated in the revised FSP.

7.3 SOIL PHYSICAL PARAMETERS ANALYSIS

EPA anticipates requiring soil physical parameters for conducting a HHRA at the Montrose Property. Therefore, per EPA's request, discrete soil samples will be collected from selected on-Property borings and analyzed for various physical parameters. Soil samples will be collected at target depths of 5, 15, 35-feet bgs, which are consistent with the sample depths used during the soil gas survey conducted at the Property in 2004. Soil samples will be collected from 11 deep soil borings as identified in their November 23, 2004 letter:

Proposed Boring	Location
C1	Near soil gas point SG01, northwest corner of Property
C9	Near soil gas point SG08, north boundary of the Property
C17	Near soil gas point SG14, northeast corner of the Property
C21	Near soil gas point SG12, located between Building pads B and C
C32	Near soil gas point SG21, located on Building pad B
C35	Near soil gas point SG22, located on Building pad A
C54	Near soil gas point SG27, south boundary of the Property
C55	Near soil gas point SG28, south boundary of the Property
C42	Near soil gas point SG20, south boundary of the Property
C59	Near soil gas point SG29, south of Building pad A
C13	Western portion of the Site

For Borings C13, C42, and C59 (drilled using roto-sonic methods), soil samples will be collected using stainless steel sleeves or equivalent containers at the specified sample depth immediately after retrieving the core, and prior to collecting other samples or conducting field screening. To access the core material for sampling, the plastic sleeve will be cut open along its entire length, and the soil samples collected at the target depths from the center of the core material. Sampling from the inside of the core is necessary to avoid sampling core wall soils that may have been affected by the drilling. Disturbance of the core

material prior to and during VOC sampling will be minimized in order to preserve the validity of the soil samples (minimize VOC loss during sampling process).

For the 8 soil borings (drilled using direct-push methods), physical parameter samples will be collected in sleeves as indicated in Section 7.2.1. The sleeve will be sealed properly on both ends with Teflon tape and caps, labeled, sealed with custody seals, placed in a re-sealable plastic bag, and immediately placed in a cooler with ice for shipment to a certified laboratory for analysis.

All physical parameter samples will be submitted to PTS Laboratory in Santa Fe Springs, California for analysis and summarized as follows:

- Bulk density by API RP40/ASTM D2937
- Total porosity by API RP40/ASTM D2216
- Water-filled porosity by API RP40/ASTM D2216
- Total organic carbon by Walkley-Black
- Permeability to air by API RP40/ASTM D2216
- Particle size/sieve by ASTM D422/4464M

7.4 DECONTAMINATION

7.4.1 EQUIPMENT DECONTAMINATION

Prior to soil drilling activities, drilling equipment such as direct-push rods, auger flights, and hand augers will be steam-cleaned and allowed to air dry. Sampling equipment such as the split-spoon samplers, and stainless-steel sleeves that directly or indirectly may contact samples will be decontaminated in a designated decontamination area. Tubs and/or 5-gallon polyethylene buckets and 1-liter labeled plastic spray bottles will be used to decontaminate the field sampling equipment. Sampling equipment generally will be decontaminated using the following procedure before its initial use and after use at each soil sampling location:

- Scrub and wash with a solution of potable water and Alconox, or an equivalent laboratory-grade detergent (nonphosphate)
- Rinse with tap water
- Rinse with trace element grade 0.1 N nitric acid solution (10% in deionized water)
- Rinse off trace element grade 0.1 N nitric acid solution (10% in deionized water) with laboratory supplied Type II reagent-grade water.
- Rinse with pesticide-grade methanol (pesticide-free) solvent
- Rinse with high-performance liquid chromatography (HPLC), organic free water
- Air-dry equipment on a clean surface such as Teflon, stainless steel, or oil-free aluminum.

Cleaned equipment will be stored in a clean area, and potentially contaminated equipment will be restricted to the decontamination area. Rinse water and decontamination fluids will be transferred from the tubs/buckets to labeled 55-gallon sealed drums for subsequent temporary storage prior to proper disposal.

An area will be set up adjacent to the decontamination area to decontaminate personal protective equipment (PPE) such as boots and gloves. Black garbage bags (i.e., Hefty®) will be used to dispose of used Tyveks®, gloves, and other PPE.

7.5 HEALTH AND SAFETY

A site-specific HASP has been prepared for field activities associated with the Supplemental Soil Investigation at the Montrose Site (Earth Tech, 2005a). The HASP identifies the potential hazards that might be encountered during performance of the subsurface investigation. The HASP is consistent with current Federal Occupational Safety and Health Administration (OSHA) requirements for hazardous waste operations [29 Code of Federal Regulations (CFR) 1910.120 (e) and (f) and California Code of Regulations (CCR) Title 8, Section 5192]. All field personnel will be required to read and sign the HASP prior to beginning work at the Site. A brief meeting will be held at the start of each workday to remind field personnel of the potential hazards and other health and safety issues associated with the sampling program. A written record of the daily safety meeting will be kept, and a copy of the HASP will be maintained at the Site during field activities.

All drilling and soil sampling activities will be conducted in modified Level D PPE in accordance with the site-specific HASP for the Site. No significant dust generation or elevated volatile organic concentrations in the breathing zone are anticipated during drilling activities of the soil borings due to the nature of direct-push and sonic drilling methods (primary methods of sampling at Site). However, soil cuttings are generated during hollow-stem and hand auger drilling, and therefore, water will be used to suppress dust generation when using these types of drilling methods. An MIE pdm-3 MiniRam meter will be used to monitor dust and particulate levels throughout the work area during drilling and soil sampling activities. Similarly, VOC concentrations in the breathing zone will be monitored using a PID or FID. Equipment calibrations will be performed prior to the start of work each day. All field air monitoring readings will be recorded in a field logbook and included in the soil investigation report. All field personnel handling the drilling and soil sampling equipment will be required to wear modified Level D PPE including, at a minimum, nitrile inner-sampling gloves and a Tyvek® suit to prevent any dermal contact with contaminated soil.

7.6 INVESTIGATION-DERIVED WASTES

Investigation-derived wastes (IDW) will consist of soil cuttings, PPE, decontamination water, and general trash.

Wastes will be disposed of at a State or Federally approved waste disposal facility. Wastes classified as hazardous waste will be disposed of offsite within 90 days of collection. Representative waste characterization samples will be collected for analysis and waste profiling as soon as practicable. Samples will be analyzed in accordance with the requirements of the disposal facility and in accordance with State and Federal regulations. After reviewing the results of the profiling, wastes will be classified in accordance with State and Federal regulations.

Soil cuttings will be stored in lined, closed top roll-off bins or Department of Transportation (DOT) 17H 55-gallon steel drums. Decontamination water will be stored separately in temporary aboveground storage tanks or DOT-rated 55-gallon steel drums. Each container will be marked clearly to indicate the waste type/source and generator information. Before disposal or shipment offsite, the containers will be labeled with appropriate DOT identification and classification information.

Used PPE and other disposable equipment used at locations where Level D site-safety protocols are required will be bagged and characterized as nonhazardous and disposed in industrial dumpsters. Heavily soiled PPE or PPE used at locations requiring a higher level of personal protection than Level D will be bagged and stored separately pending analytical results from the soil sampling. If the analytical results indicate that wastes generated at the Site were hazardous, the heavily soiled PPE will be characterized and disposed as hazardous waste.

7.7 SAMPLE CONTAINERS AND PRESERVATION

Sample container requirements and preservation methods for each analysis are summarized in **Table 7**.

7.8 SAMPLE MANAGEMENT PROCEDURES AND DOCUMENTATION

The following section discusses various sample management procedures that will be followed during the performance of field activities. Included in these sections are procedures for sample packaging and transportation, sample labeling, and sample documentation. Additional guidelines are included in **Appendix B** - EPA Region IX Instructions for Sample Shipping and Documentation.

7.8.1 SAMPLE NUMBERING AND LABELING

The sample number will consist of the boring number followed by a hyphen and the depth of the sample bgs. For example, a sample collected at 3 feet bgs in Boring C1 would have the sample number C1-3.

The following information will be written on each sample container label with a permanent marker and will be covered with clear plastic tape:

- Sample number
- Type of analysis requested
- Date and time collected

7.8.2 SAMPLE PACKAGING AND SHIPMENT

Custody seals will be placed over the lids of each sample container. Custody seals on volatile organic analysis (VOA) vials (equipment blanks, field blanks, and trip blanks) will be placed around the lid to prevent covering the septum. Sealed sample sleeves will be placed in individual re-sealable bags labeled with the sample number.

Previous labels on the cooler to be used for shipment will be removed and drain plugs will be taped closed. Samples will be packed inside the cooler with inert cushioning to prevent sample disturbance. Ice cubes, double-bagged in re-sealable bags, will be added to the cooler and placed on top of and between the samples. A chain-of-custody (COC) form shall be completed, sealed in a plastic bag, and taped to the inside of the cooler lid. The cooler will be taped shut with strapping tape, and two custody seals will be taped across the cooler lid, one in the front and one in the back. The samples then will be shipped or hand delivered to the subcontracted analytical laboratory.

Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis with a separate COC record accompanying each shipping container. All sample shipments will be picked

up by the laboratory courier and delivered to the laboratory that same day. No samples will be shipped by overnight courier or other commercial courier service.

Sample shipments that would be received on a Saturday must be cleared with the laboratory in advance to make sure that the samples can be received and that holding times will not be exceed and preservation compromised.

7.8.3 SAMPLE DOCUMENTATION

7.8.3.1 Field Logbooks

Bound and numbered logbooks will be used to record all sampling information. Information in the logbooks will include, at a minimum, the following:

- Name and title of the recorder, and date and time of entry
- General description of weather conditions
- Personnel involved with the field activities
- Photographic log, if appropriate
- Sampling location and description
- Location of duplicate and quality control (QC) samples, date and time of collection, parameters to be analyzed; sample identification numbers
- Time of sampling collection (soil and aqueous)
- Sample description
- Names of visitors, their associations, and purpose of visit
- Unusual activities such as departures from planned procedures

All logs will be completed, signed, and dated by the recorder. All logs will be written with waterproof ink. Corrections will be made by crossing out the error with a single horizontal line, initialing the correction, and entering the correct information. Crossed-out information shall be readable.

7.8.3.2 Chain-of-Custody (COC) Forms

COC procedures will be used to maintain and document sample collection and possession. After sample packaging, a COC form will be completed, as necessary.

Copies of the COC form will be filled out and distributed per instructions for sample shipping and documentation in **Appendix B**.

7.8.3.3 Photographs

Photographs may be taken of some soil sample locations with respect to the surrounding area and relative to objects used to locate the Site. The photographs will be used to provide backup documentation or procedures, unusual conditions encountered, and the general location of the sampling locations. The frame number (and roll number where applicable) corresponding to the sample location will be logged in

the field logbook. The camera will be equipped with a device to record the date and time on the photograph.

7.9 QUALITY CONTROL SAMPLES

A field QC program conforming to procedures outlined in the QAPP will be implemented to help maintain the required level of confidence in the field data and to provide cross-checks on the laboratory performing the analyses. Quality control samples such as blanks, duplicates, and matrix spikes will be collected routinely. Quality control samples will be collected for each analyte and each matrix. This sampling plan includes soil matrix samples only.

Quality control sampling described herein follows the protocol established by EPA. Because the number of QC samples frequently depends on how the fieldwork is organized and implemented, the frequency of QC sample collection should be monitored continually so unnecessary QC samples are not collected.

The following types of field QC samples will be collected:

- Duplicate samples for VOCs, metals and pesticides (10 percent)
- Equipment rinsate samples using Type II reagent water
- Trip blanks for VOCs (daily)
- Matrix spike/matrix spike duplicate samples

QC samples are described in detail in the following sections.

7.9.1 DUPLICATE SAMPLES

A field duplicate sample is a second sample collected at the same location as the original sample. Duplicate samples are collected simultaneously or in immediate succession, using identical recovery techniques, and treated in an identical manner during storage, transportation, and analysis. The sample containers are assigned identification numbers in the field such that they cannot be identified (blind duplicate) as duplicate samples by laboratory personnel performing the analysis. Specific locations are designated for collection of field duplicate samples prior to the beginning of sample collection.

Duplicate samples will be collected to assess the reproducibility of field sampling methods and the repeatability of laboratory analysis. Duplicate samples will be collected at an approximate frequency of 10 percent for all parameters analyzed for the original sample.

For duplicate soil samples (metals and pesticides), with the exception of duplicate VOC samples, soil from the sleeves will be mixed in a stainless steel bowl. Duplicate VOC samples will be collected using Encore™ samplers and preserved following EPA Method 5035. The homogenized soil will be divided into two equal portions and each portion will be placed in a separate glass jar. One portion will be the target and the other portion will be the duplicate. If insufficient sample volume exists, additional volume will be collected in a successive drive or push sample before mixing.

7.9.2 EQUIPMENT RINSATE SAMPLES

Equipment rinsate samples will be collected on the sampling equipment used in soil sampling to assess the effectiveness of equipment decontamination procedures and to evaluate the potential for cross-contamination between sample locations. Equipment rinsate blank samples will be collected daily using Type II reagent grade water.

In general, the equipment rinsate sample will be collected from the last decontamination rinsate that was poured over the equipment following decontamination. The sample shall be analyzed for all laboratory analyses requested for the environmental samples collected at that location.

7.9.3 TRIP BLANKS

The trip blank consists of a VOA sample vial filled in the laboratory with certified organic-free water, transported to the sampling site, handled like an environmental sample and returned to the laboratory for analysis. Trip blanks are not opened in the field. Trip blanks are prepared only when VOC samples are collected and are analyzed only for VOC analytes. Trip blanks are used to assess the potential introduction of contaminants from sample containers or during the transportation and storage procedures. One trip blank shall accompany each cooler sent to the laboratory for sample analysis of VOCs.

7.9.4 LABORATORY QUALITY CONTROL SAMPLES

Because laboratory analyses are following SW 846 guidance, laboratory quality control samples called matrix spike and matrix spike duplicates (MS/MSD) will be collected. MS/MSD will be performed at the following frequency, which ever is more frequent:

- Each 20 field samples, not to exceed 14 days

Triple volume of samples will be collected where MS/MSD samples are required. The first volume is for the site sample, the second volume is for the matrix spike analysis, and the third volume is for the matrix spike duplicate sample analysis. For VOC analysis, the first set of three Encore™ samples is for the site sample, the second set of three are for the matrix spike, and the third set of three are for the matrix spike duplicate, for a total of nine Encore™ sample containers.

Collection of MS/MSDs must be coordinated with the laboratory. The sample will be identified and denoted as an MS or MSD on the sample container and the Chain-of-Custody Record.

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TABLES

TABLE 1
EPA Region IX Preliminary Remediation Goals (PRGs) for Compounds of Concern in Soil
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Compound	Preliminary Remediation Goals (mg/kg)	
	Residential Soil	Industrial Soil
Benzene	0.64	1.4
BHC-alpha	0.09	0.36
BHC-beta	0.32	1.3
BHC-gamma (lindane)	0.44	1.7
BHC-delta	NA	NA
Carbon tetrachloride	0.25	0.55
Chloroform	0.22	0.47
Chloroform (CA modified)	0.94	2
Chromium III (trivalent)	100,000	100,000
Chromium VI (hexavalent)	30	64
Chromium, Total	210	450
1,2-Dichlorobenzene	600	600
1,3-Dichlorobenzene	530	600
1,4-Dichlorobenzene	3.4	7.9
1,1-Dichloroethane	510	1,700
1,1-Dichloroethane (CA modified)	2.8	6
1,1-Dichloroethene	120	410
1,2-Dichloroethane	0.28	0.6
cis-1,2-Dichloroethene	43	150
trans-1,2-Dichloroethene	69	230
Ethylbenzene	400	400
Lead (trivalent)	400	800
Lead (CA Modified)	150	NA
Methylene chloride	9.1	21
Monochlorobenzene (MCB)	150	530
1,1,2,2-Tetrachloroethane	0.41	0.93
Tetrachloroethene	0.48	1.3
Toluene	520	520
1,2,4-Trichlorobenzene	62	220
1,1,2-Trichloroethane	0.73	1.6
1,1,1-Trichloroethane	1200	1200
Trichloroethene	0.053	0.11
Trichloroethene (CA Modified)	2.9	6.5
Vinyl chloride	0.079	0.75
Xylenes, Total	270	420

Notes:

All VOC compounds which are of potential concern were added to Table 1.

BHC=benzene hexachloride

mg/kg=milligrams per kilogram

NA= Not applicable. The industrial PRG for lead is not available

TABLE 2
Summary of On or Near Property Objective-Specific Sampling Protocols
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Boring Type	Sample Depth (feet bgs)	Pesticides Protocol[1, 2 & 5] EPA Method 8081A		VOC Protocol[3] EPA Method 8260B	Metals Protocol[4] EPA Method 6010B
		DDT	BHC		
Shallow Borings (reworked and Shallow Native)	1	X	X	X	X
	3	X	X	X	X
	5	X	X	X	X
	7	X	X	X	X
	10	X	X	X	X
	15	X	X	X	X
Deep Borings (reworked and native soil to 60 and/or 90 feet)	1	X	X	X	X
	3	X	X	X	X
	5	X	X	X	X
	7	X	X	X	X
	10	X	X	X	X
	15	X	X	X	X
	20	X	X	X	X
	30	X	X	X	X
	40	X	X	X	X
	50	X	X	X	X
	60, 70, 80 & 90	X	X	X	X

Notes:
Soil samples will be collected at 15 feet, or 70 feet, 80 feet and 90 feet bgs only at those locations that specify such in Table 4.

Soil from borings exhibiting evidence of NAPL (e.g. staining or odor) shall be sampled and analyzed by EPA Methods 8260B and 8081A. Soil samples will be analyzed using data quality parameters specified in the Revised QAPP.

X= Sample collected for analysis
bgs = below ground surface
DDT= Dichlorodiphenyl-trichloroethane
BHC= Benzene hexachloride
VOC= volatile organic compounds
PRG= preliminary remediation goals

Footnotes:

1. The samples collected from shallow borings (to 15 feet bgs) shall be analyzed by the laboratory for DDT by EPA Method 8081A using data quality parameters specified in the Revised QAPP and all DDT isomers (including the 2,4'- isomers) shall be quantitated. Also, these samples shall be analyzed by the laboratory for BHC by EPA Method 8081A with special handling requested for BHC extraction and analysis, and data quality parameters specified in the Revised QAPP. All BHC isomers shall be characterized, and limits of detection for total BHC shall be below 0.36 mg/kg (i.e., alpha-BHC industrial PRG). All constituents detected by EPA Method 8081A shall be reported to EPA.

2. The samples collected from deep borings will be sampled for DDT and BHC and analyzed by EPA Method 8081A, using data quality parameters specified in the Revised QAPP, with special handling requested for BHC. All DDT and BHC isomers shall be characterized, and limits of detection for total BHC will be at or below 0.36 mg/kg (i.e., alpha-BHC industrial PRG). All constituents detected by EPA Method 8081A shall be reported to EPA.

3. In the field, a separate sample from the same depth interval as each sample shall be subjected to head-space analysis using a photo-ionization detector (PID) and flame-ionization detector (FID) or similar equipment, and the findings reported. With the exception of those soil samples from six (6) borings, all collected samples will be submitted for laboratory VOC analysis. All detected constituents shall be reported to EPA. Samples collected from six borings located along the eastern-most edge of the Montrose Plant Property (i.e., C12, C19, C28, C37, C47 and C53) will be subjected to head-space analysis in the field using a PID/FID, and submitted for laboratory VOC analysis if PID/FID readings exceed 10 ppm. Chemicals of interest vary by location, but include: MCB, dichlorobenzenes, chloral hydrate, chloroform, BTEX, and PCE, TCE, and DCE and related degradation compounds.

4. All soil samples collected from each shallow and deep boring will be submitted to the laboratory for metals analysis, and a 2-week turnaround will be requested for total chromium analysis. If total chromium results exceed the industrial PRG for hexavalent chromium (Cr^{6+}, 64 parts per million [ppm]), resubmit the sample for analysis of Cr^{6+} by EPA Method 7199. The holding times for hexavalent chromium in soil are 30 days for extraction and 24 hours after extraction. EPA Methods with limits of detection significantly below the analyte-specific benchmark values, will be used for metals analysis, and data quality parameters specified in the Revised QAPP.

5. All DDT, DDE and DDD isomers (including the 2,4'- isomers) and BHC isomers shall be quantitated and individually reported.

TABLE 3
Summary of Off-Property Objective-Specific Sampling Protocols
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Sampling Depth (feet bgs)	LADWP Right-of-Way, Farmer Bros. Property		Western Waste Parcel			Business Area East of Normandie
			Swale area	East of swale	Southwestern area	
Surface: Upper 6 inches	DDT	BHC	DDT and BHC	DDT and BHC	DDT and BHC	DDT and BHC
2	DDT	BHC	DDT and BHC	DDT and BHC	DDT and BHC	DDT and BHC
4	DDT	BHC	DDT and BHC	DDT and BHC	DDT and BHC	NA
6	DDT	BHC	DDT and BHC	NA	DDT and BHC	NA
8	NA	NA	DDT and BHC	NA	NA	NA

Notes:

All DDT and /or BHC samples will be sent to the laboratory for analysis by EPA Method 8081.
All DDT, DDE and DDD isomers (including the 2,4'- isomers) and BHC isomers shall be quantitated and individually reported. Note: all constituents detected by EPA Method 8081 shall be reported to EPA.
NA - not analyzed

TABLE 4
Borehole Classifications
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

						Revised Requested Analyses					
Proposed Boring I.D.	Previous Boring I.D.	Location Category	Property Owner	Boring Type	Sample Depths Below Ground Surface	VOCs	Metals	BHC	DDT	Physical Parameters	Recommendations for each Sampling Location
C1	C1	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X				
					5, 15, 35					X	
C2	C2	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C3	C3	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C4	C4	On-Property	Montrose	Shallow	1,3,5,7,10,15	X	X	X	X		
C5	C51	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C6	C73	Near-Property	Boeing - GLJ Holding	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C7	C39	On-Property	Montrose	Shallow	1,3,5,7,10		X				
C8	C38	Near-Property	Boeing - GLJ Holding	Shallow	1,3,5,7,10				X		
C9	C50	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
					5, 15, 35					X	
C10	C53	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C11	C40	On-Property	Montrose	Shallow	1,3,5,7,10,15		X	X	X		
C12	C41	Near-Property	UPRR	Shallow	0.5, 2, 4, 6	P	X	X	X		
C13	C6	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X	X	X	X		
					5, 15, 35					X	
C14	C19	On-Property	Montrose	Shallow	1,3,5,7,10,15	X	X	X	X		
C15	C52	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C16	C42	On-Property	Montrose	Shallow	1,3,5,7,10,15		X	X			
C17	C57	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
					5, 15, 35					X	
C18	C43	On-Property	Montrose	Shallow	1,3,5,7,10		X	X			
C19	C78	Near-Property	UPRR	Shallow	0.5, 2, 4, 6	P	X	X	X		
C20	C8	On-Property	Montrose	Shallow	1,3,5,7,10			X	X		
C21	C18	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
					5, 15, 35					X	
C22	C20	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
C23	C9	On-Property	Montrose	Shallow	1,3,5,7,10			X	X		
C24	C10	On-Property	Montrose	Shallow	1,3,5,7,10		X	X	X		
C25	C11	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C26	C21	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X				
C27	C44	On-Property	Montrose	Shallow	1,3,5,7,10,15		X	X	X		
C28	C45	Near-Property	UPRR	Shallow	0.5, 2, 4, 6	P	X	X	X		
C29	C12	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
C30	C25	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X		X	X		
C31	C22	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X				

TABLE 4
Borehole Classifications
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

						Revised Requested Analyses					
Proposed Boring I.D.	Previous Boring I.D.	Location Category	Property Owner	Boring Type	Sample Depths Below Ground Surface	VOCs	Metals	BHC	DDT	Physical Parameters	Recommendations for each Sampling Location
C32	C68	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
					5, 15, 35					X	
C33	C54	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C34	C46	On-Property	Montrose	Shallow	1,3,5,7,10,15		X	X			
C35	C65	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
					5, 15, 35					X	
C36	C47	On-Property	Montrose	Shallow	1,3,5,7,10,15		X	X	X		
C37	C79	Near-Property	UPRR	Shallow	0.5, 2, 4, 6	P	X	X	X		
C38	C13	On-Property	Montrose	Shallow	1,3,5,7,10			X	X		
C39	C14	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C40	C16	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C41	C55	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C42	C26	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X	X	X	X		
					5, 15, 35					X	
C43	C27	On-Property	Montrose	Shallow	1,3,5,7,10,15	X	X	X	X		
C44	C28	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X		X	X		
C45	C56	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C46	C70	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
C47	C49	Near-Property	UPRR	Shallow	0.5, 2, 4, 6	P	X	X	X		
C48/SSB-15	C60/SSB-15	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X		X	X		Boring has been completed to 90 feet bgs
C49	C29	On-Property	Montrose	Shallow	1,3,5,7,10,15	X	X	X	X		
C50	C58	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C51/TSB-14	C61/TSB-14	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X		X	X		Boring has been completed to 90 feet bgs
C52/TSB-15	C62/TSB-15	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X		X	X		Boring has been completed to 90 feet bgs
C53	C80	Near-Property	UPRR	Shallow	0.5, 2, 4, 6	P	X	X	X		
C54	C32	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
					5, 15, 35					X	
C55	C33	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
					5, 15, 35					X	
C56/TSB-4	C63/TSB-4	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X		X	X		Boring has been completed to 90 feet bgs
C57	C64	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C58	C189	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C59	C66	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X		X	X		
					5, 15, 35					X	
C60	C59	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		

TABLE 4
Borehole Classifications
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

						Revised Requested Analyses					
Proposed Boring I.D.	Previous Boring I.D.	Location Category	Property Owner	Boring Type	Sample Depths Below Ground Surface	VOCs	Metals	BHC	DDT	Physical Parameters	Recommendations for each Sampling Location
C61	C69	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
C62	C75	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C63	C76	On-Property	Montrose	Shallow	1,3,5,7,10		X	X	X		
C64	C71	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X	X	X	X		
C65	C72	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60		X				
C66	C92	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6			X	X		
C67	C93	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6			X	X		
C68	C98	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6			X	X		
C69	C99	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6			X	X		
C70	C100	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6				X		
C71	C82	Near-Property	UPRR Ponding Area	Shallow	1,3,5,7,10	X	X	X	X		
C72	C101	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6			X	X		
C73	C108	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6			X			
C74	C109	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6			X			
C75	C110	Near-Property	LADWP, W of Normandie	Shallow	1,3,5,7,10		X	X	X		
C76	C83	Near-Property	UPRR	Shallow	1,3,5,7,10	X	X	X	X		
C77	C112	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6			X	X		
C78	C113	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6			X	X		
C79	C114	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6			X	X		
C80	C115	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6			X	X		
C81	C116	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6			X	X		
C82	C117	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6			X	X		
C83	C118	Off-Property	LADWP, W of Normandie	Shallow	0.5, 2, 4, 6			X	X		
C84	C120	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C85	C121	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C86	C122	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C87	C123	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C88	C124	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C89	C127	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C90	C128	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C91	C129	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C92	C130	Near-Property	Farmer Brothers	Shallow	1,3,5,7,10		X	X	X		
C93	C132	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C94	C133	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C95	C134	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C96	C135	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C97	C141	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C98	C86	Near-Property	UPRR Ponding Area	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C99	C85	Near-Property	UPRR	Shallow	1,3,5,7,10			X	X		
C100	C137	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C101	C142	Near-Property	Farmer Brothers	Shallow	1,3,5,7,10		X	X	X		

TABLE 4
Borehole Classifications
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

						Revised Requested Analyses					
Proposed Boring I.D.	Previous Boring I.D.	Location Category	Property Owner	Boring Type	Sample Depths Below Ground Surface	VOCs	Metals	BHC	DDT	Physical Parameters	Recommendations for each Sampling Location
C102	C87	Near-Property	UPRR	Shallow	1,3,5,7,10			X	X		
C103	C138	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C104	C143	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C105	C144	Near-Property	Farmer Brothers	Shallow	1,3,5,7,10		X	X	X		
C106	C89	Near-Property	UPRR	Shallow	1,3,5,7,10			X	X		
C107	C139	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X	X		
C108	C140	Off-Property	Farmer Brothers	Shallow	0.5, 2, 4, 6			X			
C109	C145	Near-Property	Farmer Brothers	Shallow	1,3,5,7,10		X	X	X		
C110	C90	Near-Property	UPRR	Shallow	1,3,5,7,10			X	X		
C111	C190	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C112	C191	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C113	C193	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C114	C194	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C115	C195	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C116	C196	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C117	C197	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C118	C198	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C119	C199	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C120	C200	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C121	C201	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C122	C202	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C123	C203	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C124	C204	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C125	C205	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C126	C206	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C127	C207	Off-Property	Business Area E of Normandie	Shallow	0.5, 2			X	X		
C128	C208	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4, 6, 8			X	X		
C129	C209	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4			X	X		
C130	C210	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4			X	X		
C131	C211	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4			X	X		
C132	C212	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4, 6, 8			X	X		
C133	C213	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4, 6, 8			X	X		
C134	C214	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4			X	X		
C135	C215	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4			X	X		
C136	C216	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C137	C217	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C138	C218	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4			X	X		
C139	C219	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4			X	X		
C140	C220	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4			X	X		
C141	C228	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6			X	X		

TABLE 4
Borehole Classifications
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

						Revised Requested Analyses					
Proposed Boring I.D.	Previous Boring I.D.	Location Category	Property Owner	Boring Type	Sample Depths Below Ground Surface	VOCs	Metals	BHC	DDT	Physical Parameters	Recommendations for each Sampling Location
C142	C221	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C143	C222	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C144	C225	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C145	C229	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6			X	X		
C146	C232	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C147	C233	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C148	C226	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C149	C227	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4			X	X		
C150	C230	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6			X	X		
C151	C231	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6			X	X		
C152	C234	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		

Notes:

Shallow = Boring advanced using direct push to approximately 1 to 10 feet bgs, depending on sample depths

Deep = Boring drilled using hollow stem auger rig to approximately 60 to 70 feet bgs, depending on depth to groundwater

P = Test for VOC's only if PID reading is elevated

TABLE 5
Borehole Classifications and Total Sample Count
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

						Revised Requested Analyses					
Proposed Boring I.D.	Previous Boring I.D.	Location Category	Property Owner	Boring Type	Sample Depths Below Ground Surface	VOCs	Metals	BHC	DDT	Physical Parameters	Recommendations for each Sampling Location
CPT RIG											
C1	C1	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X				
					5, 15, 35					X	
C5	C51	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C9	C50	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
					5, 15, 35					X	
C10	C53	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C17	C57	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
					5, 15, 35					X	
C21	C18	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
					5, 15, 35					X	
C29	C12	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
C15	C52	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C33	C54	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C61	C69	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
C65	C72	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60		X				
C54	C32	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
					5, 15, 35					X	
C55	C33	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
					5, 15, 35					X	
C57	C64	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C60	C59	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
C22	C20	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
C26	C21	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X				
C35	C65	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
					5, 15, 35					X	

TABLE 5
Borehole Classifications and Total Sample Count
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

						Revised Requested Analyses					
Proposed Boring I.D.	Previous Boring I.D.	Location Category	Property Owner	Boring Type	Sample Depths Below Ground Surface	VOCs	Metals	BHC	DDT	Physical Parameters	Recommendations for each Sampling Location
CPT RIG											
C46	C70	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X	X	X		
C31	C22	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X	X				
C32	C68	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
					5, 15, 35					X	
C41	C55	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C45	C56	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C50	C58	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C6	C73	Near-Property	Boeing-GLJ Holding	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
C64	C71	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X	X	X	X		
C98	C86	Near-Property	UPRR Ponding Area	Deep	1,3,5,7,10,20,30,40,50,60	X		X	X		
CPT Rig Totals (27 boring locations = 25 on-site + 1 off-site + 1 deep direct push)						263	133	233	233	24	

TABLE 5
Borehole Classifications and Total Sample Count
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

						Revised Requested Analyses					
Proposed Boring I.D.	Previous Boring I.D.	Location Category	Property Owner	Boring Type	Sample Depths Below Ground Surface	VOCs	Metals	BHC	DDT	Physical Parameters	Recommendations for each Sampling Location
DIRECT PUSH-ON-PROPERTY											
C2	C2	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C3	C3	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C4	C4	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C23	C9	On-Property	Montrose	Shallow	1,3,5,7,10			X	X		
C24	C10	On-Property	Montrose	Shallow	1,3,5,7,10		X	X	X		
C38	C13	On-Property	Montrose	Shallow	1,3,5,7,10			X	X		
C39	C14	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C20	C8	On-Property	Montrose	Shallow	1,3,5,7,10			X	X		
C25	C11	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C40	C16	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C43	C27	On-Property	Montrose	Shallow	1,3,5,7,10,15	X	X	X	X		
C49	C29	On-Property	Montrose	Shallow	1,3,5,7,10,15	X	X	X	X		
C58	C189	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C14	C19	On-Property	Montrose	Shallow	1,3,5,7,10,15	X	X	X	X		
C7	C39	On-Property	Montrose	Shallow	1,3,5,7,10		X				
C11	C40	On-Property	Montrose	Shallow	1,3,5,7,10,15		X	X	X		
C16	C42	On-Property	Montrose	Shallow	1,3,5,7,10,15		X	X			
C18	C43	On-Property	Montrose	Shallow	1,3,5,7,10		X	X			
C27	C44	On-Property	Montrose	Shallow	1,3,5,7,10,15		X	X	X		
C34	C46	On-Property	Montrose	Shallow	1,3,5,7,10,15		X	X			
C36	C47	On-Property	Montrose	Shallow	1,3,5,7,10,15		X	X	X		
C62	C75	On-Property	Montrose	Shallow	1,3,5,7,10	X	X	X	X		
C63	C76	On-Property	Montrose	Shallow	1,3,5,7,10		X	X	X		
On-Site Direct Push Totals (23 boring locations)						58	108	118	101	0	

TABLE 5
Borehole Classifications and Total Sample Count
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

						Revised Requested Analyses					
Proposed Boring I.D.	Previous Boring I.D.	Location Category	Property Owner	Boring Type	Sample Depths Below Ground Surface	VOCs	Metals	BHC	DDT	Physical Parameters	Recommendations for each Sampling Location
DIRECT PUSH-OFF-PROPERTY											
C71	C82	Near-Property	UPRR Ponding Area	Shallow	1,3,5,7,10	X	X	X	X		
C75	C110	Near-Property	LADWP	Shallow	1,3,5,7,10		X	X	X		
C74	C109	Off-Property	LADWP	Shallow	0.5, 2, 4, 6			X			
C70	C100	Off-Property	LADWP	Shallow	0.5, 2, 4, 6				X		
C73	C108	Off-Property	LADWP	Shallow	0.5, 2, 4, 6			X			
C69	C99	Off-Property	LADWP	Shallow	0.5, 2, 4, 6			X	X		
C68	C98	Off-Property	LADWP	Shallow	0.5, 2, 4, 6			X	X		
C83	C118	Off-Property	LADWP	Shallow	0.5, 2, 4, 6			X	X		
C82	C117	Off-Property	LADWP	Shallow	0.5, 2, 4, 6			X	X		
C81	C116	Off-Property	LADWP	Shallow	0.5, 2, 4, 6			X	X		
C80	C115	Off-Property	LADWP	Shallow	0.5, 2, 4, 6			X	X		
C79	C114	Off-Property	LADWP	Shallow	0.5, 2, 4, 6			X	X		
C77	C112	Off-Property	LADWP	Shallow	0.5, 2, 4, 6			X	X		
C78	C113	Off-Property	LADWP	Shallow	0.5, 2, 4, 6			X	X		
C66	C92	Off-Property	LADWP	Shallow	0.5, 2, 4, 6			X	X		
C67	C93	Off-Property	LADWP	Shallow	0.5, 2, 4, 6			X	X		
C72	C101	Off-Property	LADWP	Shallow	0.5, 2, 4, 6			X	X		
C84	C120	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C93	C132	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C85	C121	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C94	C133	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C86	C122	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C87	C123	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C88	C124	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		

TABLE 5
Borehole Classifications and Total Sample Count
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

						Revised Requested Analyses					
Proposed Boring I.D.	Previous Boring I.D.	Location Category	Property Owner	Boring Type	Sample Depths Below Ground Surface	VOCs	Metals	BHC	DDT	Physical Parameters	Recommendations for each Sampling Location
DIRECT PUSH-OFF-PROPERTY											
C95	C134	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C96	C135	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C89	C127	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C90	C128	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C91	C129	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C92	C130	Near-Property	Farmer Bros.	Shallow	1,3,5,7,10		X	X	X		
C97	C141	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C101	C142	Near-Property	Farmer Bros.	Shallow	1,3,5,7,10		X	X	X		
C100	C137	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C103	C138	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C107	C139	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C108	C140	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X			
C104	C143	Off-Property	Farmer Bros.	Shallow	0.5, 2, 4, 6			X	X		
C109	C145	Near-Property	Farmer Bros.	Shallow	1,3,5,7,10		X	X	X		
C105	C144	Near-Property	Farmer Bros.	Shallow	1,3,5,7,10		X	X	X		
C144	C225	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C148	C226	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C149	C227	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4			X	X		
C140	C220	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4			X	X		
C136	C216	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C137	C217	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C138	C218	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4			X	X		
C139	C219	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4			X	X		
C142	C221	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		

TABLE 5
Borehole Classifications and Total Sample Count
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

						Revised Requested Analyses					
Proposed Boring I.D.	Previous Boring I.D.	Location Category	Property Owner	Boring Type	Sample Depths Below Ground Surface	VOCs	Metals	BHC	DDT	Physical Parameters	Recommendations for each Sampling Location
DIRECT PUSH-OFF-PROPERTY											
C143	C222	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C128	C208	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4, 6, 8			X	X		
C129	C209	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4			X	X		
C130	C210	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4			X	X		
C131	C211	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4			X	X		
C132	C212	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4, 6, 8			X	X		
C133	C213	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4, 6, 8			X	X		
C134	C214	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4			X	X		
C135	C215	Off-Property	LADWP, E of Normandie	Shallow	0.5, 2, 4			X	X		
Off-Site Direct Push Totals (57 locations = 18 Western+22 Farmer + 16 LADWP + 1 Near)						5	30	230	222	0	

TABLE 5
Borehole Classifications and Total Sample Count
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

						Revised Requested Analyses					
Proposed Boring I.D.	Previous Boring I.D.	Location Category	Property Owner	Boring Type	Sample Depths Below Ground Surface	VOCs	Metals	BHC	DDT	Physical Parameters	Recommendations for each Sampling Location
HAND AUGERING LOCATIONS											
C8	C38	Near-Property	Boeing-GLJ Holding	Shallow	1,3,5,7,10				X		
C12	C41	Near-Property	UPRR	Shallow	0.5, 2, 4, 6	P	X	X	X		
C19	C78	Near-Property	UPRR	Shallow	0.5, 2, 4, 6	P	X	X	X		
C28	C45	Near-Property	UPRR	Shallow	0.5, 2, 4, 6	P	X	X	X		
C37	C79	Near-Property	UPRR	Shallow	0.5, 2, 4, 6	P	X	X	X		
C47	C49	Near-Property	UPRR	Shallow	0.5, 2, 4, 6	P	X	X	X		
C53	C80	Near-Property	UPRR	Shallow	0.5, 2, 4, 6	P	X	X	X		
C76	C83	Near-Property	UPRR	Shallow	1,3,5,7,10	X	X	X	X		
C99	C85	Near-Property	UPRR	Shallow	1,3,5,7,10			X	X		
C102	C87	Near-Property	UPRR	Shallow	1,3,5,7,10			X	X		
C106	C89	Near-Property	UPRR	Shallow	1,3,5,7,10			X	X		
C110	C90	Near-Property	UPRR	Shallow	1,3,5,7,10			X	X		
C141	C228	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6			X	X		
C150	C230	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6			X	X		
C145	C229	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6			X	X		
C151	C231	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6			X	X		
C146	C232	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C147	C233	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C152	C234	Off-Property	Western Waste/WM	Shallow	0.5, 2, 4, 6, 8			X	X		
C111	C190	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C112	C191	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C113	C193	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C114	C194	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C115	C195	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		

TABLE 5
Borehole Classifications and Total Sample Count
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

						Revised Requested Analyses					
Proposed Boring I.D.	Previous Boring I.D.	Location Category	Property Owner	Boring Type	Sample Depths Below Ground Surface	VOCs	Metals	BHC	DDT	Physical Parameters	Recommendations for each Sampling Location
HAND AUGERING LOCATIONS											
C116	C196	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C117	C197	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C118	C198	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C119	C199	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C120	C200	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C121	C201	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C122	C202	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C123	C203	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C124	C204	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C125	C205	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C126	C206	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
C127	C207	Off-Property	Bus. Area E of Normandie	Shallow	0.5, 2			X	X		
Hand Augering Totals (36 boring locations = 17 Commercial + 7 western + 12 Near)						5	29	114	119	0	

TABLE 5
Borehole Classifications and Total Sample Count
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

						Revised Requested Analyses					
Proposed Boring I.D.	Previous Boring I.D.	Location Category	Property Owner	Boring Type	Sample Depths Below Ground Surface	VOCs	Metals	BHC	DDT	Physical Parameters	Recommendations for each Sampling Location
OVERSIGHT-ROTARY SONIC											
C13	C6	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X	X	X	X		
					5, 15, 35					X	
C30	C25	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X		X	X		
C42	C26	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X	X	X	X		
					5, 15, 35					X	
C44	C28	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X		X	X		
C59	C66	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X		X	X		
					5, 15, 35					X	
Rotary Sonic Totals (5 boring locations = 5 on-site)						65	26	65	65	9	
BORINGS PREVIOUSLY COMPLETED											
C48/SSB-15	C60/SSB-15	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X		X	X		Boring has been completed to 90 feet bgs
C51/TSB-14	C61/TSB-14	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X		X	X		Boring has been completed to 90 feet bgs
C52/TSB-15	C62/TSB-15	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X		X	X		Boring has been completed to 90 feet bgs
C56/TSB-4	C63/TSB-4	On-Property	Montrose	Deep	1,3,5,7,10,20,30,40,50,60,70,80,90	X		X	X		Boring has been completed to 90 feet bgs
Previous Boring Completed						0	0	0	0	0	
					Grand Total	397	330	764	742	33	

Notes:

Deep = Boring drilled using hollow stem auger rig to approximately 60 to 70 feet bgs, depending on depth to groundwater

Shallow = Boring advanced using direct push to approximately 1 to 10 feet bgs, depending on sample depths

P = Test for VOC's only if PID/FID readings are elevated

TABLE 6
Aqueous Quality Control Samples
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Quality Control	Purpose	Frequency or Number Collected	Instructions
Field Duplicate Samples	Assess reproducibility of field sampling method and repeatability of laboratory analysis.	10% of samples collected per day if < 10 samples, only one sample	Duplicate sample is collected at same location (simultaneously or immediate succession) as original sample. Sample using identical technique, manner of storage, transport and analysis. Label container so laboratory personnel are unable to identify sample as a duplicate.
Trip Blanks (for VOCs only)	For VOC analysis. To indicate whether field samples have been contaminated during storage or shipping.	One set of three 40-ml VOA vials to accompany each cooler that contains water samples for VOC analysis	The trip blank consists of a VOA sample vial filled in the laboratory with certified organic-free water, transported to the sampling site, handled like an environmental sample and returned to the laboratory for analysis. Trip blanks are not opened in the field. Trip blanks are prepared only when VOC samples are collected and are analyzed only for VOC analytes. Trip blanks are used to assess the potential introduction of contaminants from sample containers or during the transportation and storage procedures. One trip blank shall accompany each cooler sent to the laboratory for sample analysis of VOCs.
Equipment Rinsate Blanks	To ensure all non-dedicated sampling devices have been decontaminated effectively.	One sample collected daily and analyzed for all analyses requested per location per day of event.	Equipment rinsate blanks will consist of rinsewater used in the final step of the sampling equipment decontamination procedure.
Matrix Spike or Matrix Spike Duplicate (MS/MSD)	To check the precision and accuracy of the analytical methods through the analysis of a field sample with a known amount of analyte added.	One triple volume MS/MSD sample, for each 20 field samples or at least every 14 days (whichever is more frequent)	Collection of MS/MSD must be coordinated with the laboratory. The sample will be identified and denoted as an MS or MSD on the sample bottle and the chain-of-custody record.

TABLE 7
Sample Containers, Preservatives, and Analytical Holding Time Requirements
Montrose Superfund Site
20201 Normandie Avenue, Torrance, California

Media	Analysis	Sample Container	Number of Containers	Preservatives	Analytical Holding Times	Comments
Soil	**VOCs** (EPA Method 5035/8260B)	Encore or equivalent samples	3 (1)	Chill to 4°C	48 hours; if not prepared within 48 hours, freeze and prep within 7 days	
	Pesticides (EPA Method 8081A including all DDT, DDE, and DDD and BHC isomers)	stainless steel, acetate sleeves or glass jars	1 (2)	Chill to 4°C	<14 days before extraction, <40 days after extraction	Cap both ends of sleeve
	Metals (arsenic, total chromium and lead by EPA Method 6020);	stainless steel, acetate sleeves or glass jars	1(2)	Chill to 4°C	6 months (2-week turnaround for total chromium)	Cap both ends of sleeve
	Chromium 6 by EPA Method 7199	stainless steel, acetate sleeves or glass jars	1(2)	Chill to 4°C	<30 days until prep; < 24 hrs after prep	Analysis for chromium 6 only if total chromium is greater than 64 mg/kg
Aqueous	**VOCs** (EPA Method 8260B)	40 ml VOA glass vials	3	Chill to 4°C, HCl to pH < 2	Analytical Holding Time = 14 days for analyses	
	Pesticides (EPA Method 8081A including all DDT, DDE, and DDD and BHC isomers)	1-liter amber glass bottle	1	Chill to 4°C	Analytical Holding Time = 7 days for extraction, 40 days for analyses	
	Metals (arsenic, total chromium and lead by EPA Method 6020)	500 ml HDPE	1	Chill to 4°C HNO_3 to pH < 2	Analytical Holding Time = 6 months	

Notes:

(1) Three Encore or equivalent for each soil sample; 9 when MS/MSD is requested.
(2) Sleeves and glass jars will be used for metals and pesticide analysis, where collection of duplicate or split samples require mixing prior to sample division.

VOC's = Volatile Organic Compounds

FIGURES